

# TETANUS NEONATORUM : A REVIEW OF MANAGEMENT

By

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## Introduction :

Tetanus Neonatorum is fortunately not a common disease in the Sudan. But because Tetanus Neonatorum still occurs and because it is an imminantly preventable disease, we would like to review the recent advance in its prevention and in the management of established cases, with particular reference to a case that was successfully managed in Khartoum Civil Hospital.

## Material and Methods.

W.I.S. was born at Khartoum Civil Hospital on the 15th of December 1976 by normal vaginal delivery at full term. He was delivered in Hospital because his mother has suffered repeated urinary tract infections during her pregnancy. His mother had previously delivered normal children. The patient's birth weight was three Kilograms. He cried at birth and caused no concern in the immediate post-natal period. At three days of age, however, his mother noticed that the umbilical stump was swollen, erythematous and smelt unpleasant. An umbilical swab and a sample of blood for culture were taken and the patient was put on Amp'clox Neonatal 75 mg. m. six hourly for two days. His condition improved and both he and his mother were discharged five days after delivery. At this time the swab culture from the umbilical stump was reported as growing *E. coli*, sensitive to Ampicillin.

Three days after discharge, when the baby was seven days old, his grandmother noted that he was irritable, feverish, and was unwilling to feed. The next day she noted that he clenched his teeth so that she had to press open his mouth to feed him. His hand were also clenched into fists and his arms were in fixed flexion. She decided to bring the child to the Casualty department.

On examination the child looked ill. He had a temperature of 104 degrees farenheit (rectal). His respiratory rate was 80 breaths per minute and his heart rate was 140 beats per minute. He showed trismus, spasms of the upper and lower limbs, with clenching of his hands. When he was disturbed his whole body would go into spasm, with arching of his back, and neck retraction. A diagnosis of Neonatal Tetanus was made.

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Investigations done on admission revealed :

Haemoglobin 13.2 grams.

W.B.C. 11,000.

Umbilical swab culture grew Clostridium Tetani.

Chest X - ray was normal.

The child was nursed in a darkened room, and was treated with 50,000 units of antitetanus serum i.v. An intravenous drip was commenced and Penicillin was given in a dose of one meganunit six hourly. For sedation, a total dose of 60 mg of Diazepam was given by continuous intravenous infusion over twenty - four hours. Phenobarbitone 15 mg was given in bolus, intramuscularly three times per day; both these drugs for a total of ten days. The baby was fed by continuous milk drip via a nasogastric tube.

The patient's condition began to improve on the tenth day after admission. The intravenous drip was discontinued and the sedation decreased. However the baby continued to have the occasional spasm for up to four weeks from the date of this admission. Thereafter he made an uneventful recovery and was discharged home six weeks after admission at the age of seven weeks. His progress to date is satisfactory.

## Discussion

Tetanus is a central nervous system disease produced by the exotoxin tetanospasmin, secreted by the anaerobic Gram Positive bacillus, Clostridium Tetani. It will be appreciated that the poorly perfused necrotic tissue of the umbilical stump offers an ideal medium for the germination of any spores of Clostridium Tetani that might be present. Fortunately, Clostridium Tetani is sensitive to Hibitane and the other antiseptic preparations that are used by most midwives, and being a non-invasive organism it will be readily killed by the local application on the umbilical stump. The spores are more resistant to antiseptics. In our case described above, the worrying thing is that the baby was delivered in hospital. Routine antiseptic precautions taken both at delivery and in the lying-in ward might have prevented this infection. It is true that many organisms can cause periomphalitis, the most common being staphylococcus. The institution of the antibiotic, Ampiclox was quite correct. Staphylococcus and Clostridium Tetani both being sensitive to Ampiclox. However Penicillin is the antibiotic of choice for the treatment of Clostridium Tetani. Unfortunately, two days treatment, even systemically, as in this case, is quite inadequate treatment for the eradication of the organism. This is because the umbilical stump is poorly perfused and thus insufficient concentrations of the antibiotic reach the offending organism. The recommended treatment is for, at the least, ten days or as long as it takes for the sign of the infection to have settled whichever is the longer.(1)

The maxim "prevention is better than cure" is never so true as in the case of Neonatal tetanus, and in recent years there have been important advances in the active prevention of this disease. It was realised that the antibody against *Clostridium Tetani* was a gammaglobulin of the IgG class. This diffuses readily across the placenta. It was thus reasoned that active immunization of the pregnant mother would passively confer protection to the newborn for upto three months, after which the active immunization of the infant could take place. This, of course, presupposes that there are facilities available for, adequate antenatal care for the mothers, and access to immunizing her at three months gestation, and ideally again at six months. (2) Although this procedure may not be practicable, nor for that matter desirable, for the population as a whole, it would be of particular benefit to those groups at risk. (3) (4).

Anti tetanus serum prepared from horse serum has the well known disadvantage of anaphylaxis, because of the introduction of foreign protein into the patient, and also because of the relatively large amount that has to be given. In many countries the introduction of hyperimmune Human Anti-tetanus Globulin, has now almost superceded the need for giving antitetanus serums. Hyperimmune Human Antitetanus Globulin can be prepared in a highly purified form by plasmaphoresis, and this reduces the risk of any anaphylactic response. The amount needed for effective prevention is also less than that of horse antiserum. The dose being 125 international units intramuscularly for under one year of age, with a maximum of 500 international units. (5) Another important advantage of Hyperimmune Human Antitetanus Globulin is its much longer duration of action than is the case of antitetanus horse serum. The former's action being in the order of three months while the latter's action is only for about two weeks. Unfortunately, to date this preparation is not readily available in the Sudan, although in the not too distant future it is hoped that it will be in distribution.

Once Neonatal tetanus is established as the diagnosis, the dangers to the baby are from the profound spasms that are triggered off by the slightest stimulus. The increased excitability of the motor-end plate, caused by the exotoxin tetanospasmin, are life threatening. The toxin abolishes synaptic inhibition, by blocking the activity of Acetylcholine between the neural end-plate and the anterior horn cell. The spasms can cause death by prolonged spells of apnoea, with consequent cyanosis, or through exhaustion, and by cardiac arrhythmias. (6)

The need for adequate sedation and the control of these spasms is obvious.

The difficulty posed by this is to achieve adequate and deep sedation without the associated respiratory depression. Many of the cases that die, do so because of complicating super added infection. This is caused by poor chest expansion, the abolition of the cough reflex, and the shallow and slow respiration. In many centers it has become the practice in severe cases to intubate the child and even perform a tracheotomy, and provide artificial ventilation, having first abolished the patient's own respiratory effort by curare. (7). The patient is then artificially ventilated until the worst of the the spasms are over. This practice is not possible in the Sudan at the present

moment because of the numerous personnel needed for nursing the patient and because of the elaborate and sophisticated analysis of the patient's blood gases, etc. In a baby the added necessity for micromethods for estimating the baby's biochemical and blood gas status, is another impediment to this form of treatment.

To prevent the complicating chest infections that frequently affect these babies on heavy sedation simple measures such as the frequent change of position of the child, and the simultaneous administration of a suitable antibiotic to eradicate any opportunist bacteria, will act to reduce the risk (8)

The specific anticonvulsant that we chose was Diazepam (Valium). This drug was chosen because it can be given by continuous intravenous infusion and the dose titrated against the response of the patient. Diazepam also has a direct muscle relaxant property and is relatively free from side effects. We maintained its intravenous administration for ten days until there were signs of improvement and then continued via the oral route for a further six weeks. A fact that is not often appreciated, is that the occasional spasm can occur as late as six weeks after the onset of the disease. It is the unexpected spasm that often kills the baby because of aspiration of the feed. Thus continuous anticonvulsant treatment is needed. Phenobarbitone was also used in conjunction with Diazepam in the first ten days in order to gain adequate control. Acting on its own, Phenobarbitone does not control the spasms well but in combination, it potentiates the action of Diazepam. Some people have used Chlorpromazine to achieve the desired sedation, usually in adults. Because of the many side effects of this drug, including its atropine like action, it is not considered to be the drug of first choice in Tetanus Neonatorum, (9). As will be noted, we maintained the baby's nutrition by continuous naso-gastric drip feeds so as to minimise the risk of regurgitation and aspiration. The maintenance of an adequate calorie intake is of vital importance for the child : as in any disease process the infant is in a catabolic state.

One of the particular aspects of management that we would particularly like to draw attention to, is the need for the active cooperation of the mother or other interested relative. The baby's life may well be dependant on this. With the limited nursing care available, especially during the night, it is of paramount importance that the child receive the correct medication regularly and good nursing. The mother is likely to be the only person whom one can guarantee to be available all the time. In our case, when the situation had been carefully explained to the mother in a way that she could understand, she was of immense help. It is sometimes necessary to repeat the explanation several times but this is time well spent. Our mother protected the baby from any intrusion, unless it was an authorised medical attendant; for absolute quiet and the minimising of sudden stimuli, such as noise, is necessary. The mother continued to express her breast milk, which was given to the baby via the naso-gastric tube, she slept with her child to prevent him becoming hypothermic, an ever present danger in Tetanus Neonatorum.

Unfortunately an attack of tetanus does not confer a significant trueas- of immunity on the child. The administration of antitetanus serum ne-egte- lises the exotxin and prevents the manufacture of antibodies from the hord<sup>d</sup>. Thus it is imperative that active immunization of the child be instituted to a recognised schedule. This will usually be given with Diphtheria and Pertussis, as a triple vaccine, at the age of three, four and five months; by which time the maternal antibodies passively transferred across the placenta will have waned, (Provided that the mother herself has been immunized).

The successful outcome of this case was in no small part due to the mother combined with the skill and good nursing of the nurses and junior doctors of C<sub>2</sub> ward.

## References .

- (1) Parry, W.H., Recent trend in immunization and Vaccination. Abstract from *World Medicine* 43 545 (1969)
- (2) Cox, C.A., Knowelden, J. and Sharrard. Tetanus Prophylaxis B.M.J., 1972 1360.
- (3) Stansfield. P.J., Gall, J. Brackonden. P.M. Single dose Antitetanus immunization *Lancet* 215: 1973.
- (4) Serrano, R.F., Prevention of Neonatal tetanus by Immunization of the Mother. *J.A.M.A.* 217 : 1558: 1971.
- (5) Shirkey, H.C., Tetanus Immunoglobulin in the Prophylaxis against Tetanus. *Journal of Paediatrics* 67; P641 1965.
- (6) Klinger, H., Tetanus in the Newborn. *J.A.M.A.* 218 : 1437 1971
- (7) Ellis, L., Staylor, F.M., Neurological and electroencephalographic sequelae of Tetanus. *Lancet* 1 : 827, 1971.
- (8) Cloe., C., Youngman, H., Treatment of Tetanus. *Lancet* 1: 1017 :1969.
- (9) Adam, E.B., et al Tetanus. Oxford. Blackwell Scientific Publications Ltd. 1969.