

Management of Tetanus Neonatorum in a Respiratory Unit

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OPSOMMING

Tetanus Neonatorum bring 'n hoë sterftesyfer mee. Voorsorg is beter as nasorg en dit is van lewensbelang om die publiek voor te lig.

Verwagende moeders word geleer om voorgeboorteklinieke te besoek, en waar omstandighede dit toeiaat, behoort die bevalling in 'n hospitaal of kliniek plaas te vind. Waar dit onmoontlik is en die bevalling tuis plaasvind behoort dit deur 'n geneesheer of distriksverpleegster waargeneem te word wat al die steriele toerusting beskikbaar sal hê.

Op dié manier sal die voorkoms van tetanus neonatorum tot 'n minimum beperk word.

INTRODUCTION

TETANUS results from infection by *clostridium tetani*, which is present in the faeces of animals and man therefore also in the soil. It enters the body through a wound; in the case of a neonate, this is always the raw surface of the umbilicus. The infection of this wound occurs by contamination of cord dressings by dust or soil, but in some cases mothers apply cow dung to the umbilicus. In some cases the umbilical cord is cut with an unsterile blade or even an old broken bottle. The baby is usually born at home.

Clostridium tetani produces a powerful exotoxin which is absorbed by the muscle end plates at the site of infection and travels along nerves to the central nervous system and affects both motor nerves and the sympathetic nervous system. The resultant clinical manifestations are increased muscle tone (*rhesus sardonius trismus* and *opisthotonus*) superimposed on which are clinical tetanic spasms. Sympathetic overactivity is not a feature in neonates, but it is a major problem in other age groups.

The time elapsing between infection and the first symptom (i.e., the incubation period) and, between the first symptom and the first tetanic spasm — the onset — are both variable but important in predicting the severity of the disease that will develop. The shorter these periods, the more severe will be the clinical manifestations.

90% of the neonates are severely affected: that is to say, most will need treatment by intermittent positive pressure respiration (I.P.P.R.) to survive. Those who do not need I.P.P.R. still need very careful management for a successful outcome.

The History

The history taken from the mother must be accurate and should elicit the incubation and onset periods, which give a good estimate of the severity that will develop in each infant.

The incubation period varies from 3 days to 3 weeks after birth, but is usually 6 - 9 days. The first symptom is excessive crying and a failure to suck. This is a manifestation of trismus in the age group. It is followed by the onset of typical tetanic spasms, usually within 24 hours, indicating severe disease.

At the time of taking history, the nature of the disease is explained to the mother, and consent for tracheostomy is obtained.

MANAGEMENT

(A) On Admission

These patients are usually referred by general practitioners and outlying hospitals to our Paediatric Out-Patient Department (P.O.P.D.) The patient comes to the Respiratory Unit accompanied by the mother and a nurse from P.O.P.D. On receiving the baby, the doctor is called to confirm the diagnosis and assess the degree of severity of the disease before sedation has altered the picture. Immediate doses of sedation are then given (Chlorpromazine 12,5 mg I.M.I. and Sodium Gardenal 66 mg I.M.I.) and after 30 minutes, by which time the sedation will be effective, the baby is undressed, weighed, washed with Savlon 1.30 and examined fully by the doctor.

Classification of tetanus —
Mild — 1 spasm in 24 hours

Moderate — short spasm occurring only on stimulation, e.g. changing of napkins

Severe — spasms occurring frequently and spontaneously often accompanied by cyanosis.

(B) Further Treatment

1. Tetanus Toxoid 0,5 ml I.M.I.: the first dose of active immunization (disease does not confer immunity).
2. Human anti-tetanus immunoglobulin 2 ampoules (500u) I.M.I. to neutralize the circulating toxin. (Once toxin is fixed to nerve tissue it cannot be affected by anti-toxin).
3. A nasogastric tube is passed by a doctor as soon as initial sedation is effective. This manoeuvre may cause a pharyngo-laryngeal spasm with cyanosis, but is usually easily overcome by giving I.P.P.R. with oxygen via a well-fitting face mask.
4. Hydrogen peroxide is used to clean the umbilicus at once and at regular intervals until clean.
5. Sedation is continued: Chlorpromazine 12,5mg I.M.I. 4 hourly. If spasms are poorly controlled in this regime, Sodium Gardenal 66 mgs I.M.I. is also given, but not more than once or twice in 24 hours, and then only specifically on doctor's orders. If more sedation is required to control spasms, it indicates that the baby has severe disease and requires treatment with I.P.P.R.
6. Aspiration of the mouth and pharynx is done 30 minutes after each dose of Chlorpromazine. Great care is taken not to suck the back of the throat because this could result in a laryngeal spasm and respiratory arrest. It is however essential to keep the sedated infant's airway clear of secretions, since aspiration of saliva during a tetanic spasm is an important cause of death.
7. Close observation of spasms gives the pointer to the severity of the disease. Mild and short spasms occurring only after stimulation e.g. changing the napkin without cyanosis, means the patient may survive conservative treatment. Severe, prolonged and spontaneously occurring spasms, especially accompanied by cyanosis, indicate I.P.P.R. is required. Observation for longer than 24 hours on sedation is seldom necessary before making the decision for I.P.P.R.
8. **Feeding:** Fortunately almost all mothers elect to remain in hospital and therefore provide expressed breast milk (E.B.M.) for their infants. Patients on conservative treatment are given small feeds — 30mls. E.B.M. 3 hourly by nasogastric tube — to prevent regurgitation and aspiration during a spasm. The volume of feed is increased as the baby's condition improves.

Before each feed the stomach is aspirated, and the content tested on blue litmus paper to ensure that the nasogastric tube is still in the stomach. The amount is noted and returned, e.g. if the aspirate is 5mls and volume to give is 30mls the amount actually given is 25 mls.

From this information a 24-hour gastric balance chart is made. If there is poor absorption, i.e. more than a 1/3 of total volume is aspirated, feeds are given slowly by nasogastric drip. Alternatively, intravenous feeding is undertaken with 0,2% saline in 5% invert sugar.

Poor absorption of feeds is usually the first indication of super-infection arising in the infant.

(C) Total muscular paralysis and intermittent positive pressure ventilation (I.P.P.V.)

Those babies whose spasms respond inadequately to sedation need a muscle relaxant drug and therefore must also receive I.P.P.V.

The tracheostomy is done in the ward under local anaesthetic by the ward doctor, assisted by a member of the nursing staff.

A tracheal swab for culture is taken at tracheostomy and then the infant is connected to a ventilator which has a heated humidifier and is set to deliver a fractional concentration of inspired oxygen of about 30% (this is checked daily). A small Positive End Expiratory Pressure is applied. The baby is paralysed by Alcuronium (Alloferin) 1,25mgs I.M.I. This is repeated whenever tetanic spasms return, i.e. when the effect of Alloferin wears off. The sedation is then stopped.

The feeds of E.B.M. are increased to 50-55mls 3 hourly (there is now less danger of aspiration).

The child is kept paralysed for 10-11 days after which residual muscle spasms are controlled by re-introduction of sedation. Weaning off the ventilator is done gradually, since the baby usually has a significant degree of increased tone for days after spasms have ceased. When capable of maintaining adequate unassisted respiration the baby's tracheostomy tube is changed to a smaller one (with a smaller lumen) and a few days later the baby is extubated.

CARE OF AN INFANT ON A RESPIRATOR

- a) Chest physiotherapy is done by the nursing staff. One nurse maintains ventilation with a physiotherapy bag, as she does chest clapping or vibration, while a second nurse performs endotracheal suctioning, which is a sterile procedure. During the day the physiotherapist is available to perform physiotherapy on the very ill patients.

This procedure, done 4 hourly is usually effective in maintaining a clear airway, but in some babies tracheal suctioning is required more often.

- b) The paralysed infant on a ventilator may easily become hypothermic. With the aid of a warm humidifier or ventilator and electric pads, great effort is made to maintain a normal body temperature.
- c) Monitoring of our patients is still entirely the nurse's task. We have as yet no mechanical monitors either on the ventilator or the baby.

Hourly pulse and temperature are taken, cyanosis watched for, ventilator pressure and rate checked and recorded. The chest movement is noted. If the movement is not satisfactory, the chest is auscultated to check that air entry is good and equal on both sides. By these observations, complications are watched for: blocked or dislodged tubes (endotracheal tubes), pneumothorax atelectasis. The paralysed neonate cannot struggle nor otherwise indicate that his ventilation is inadequate for any of these reasons.

The ventilator pressure readings and humidifier temperature are also checked hourly and entered on an observation chart. All connections are checked continually to ensure that they are tight and well secured.

- d) The infant's mother comes into the ward and is taught to tube-feed her baby, after which she sits with him for some time. When the baby is off the ventilator the mother is encouraged to pick him up and feed him. Initially, Belcroy feeds are necessary because the baby has residual trismus and finds breast-feeding difficult.

OUR MAJOR PROBLEMS

The neonate with tetanus is a great nursing challenge. Successful management produces a well baby but only after meticulous attention to detail sustained for 5 to 6 weeks.

The major problems are not really due to tetanus as such, but are problems of a sick neonate and of the ventilated patient.

The neonate is very susceptible to infection. He is easily contaminated by hands, catheters and solutions etc. Every member of the staff must know this and be taught how to prevent cross-infecting the patients.

The major problem with a neonate on a ventilator (each for a minimum of 4 weeks) is the technique of chest physiotherapy. This must be done gently but effectively. Traumatic haemorrhage from an inexpertly suctioned trachea and lung infection from failure to remove secretions, can cost the baby his life or delay his discharge by weeks.

Finally we have the problem of watching for blocked tubes, or ventilator failure, in a ward of 6 infants all with tracheostomy tubes and some on ventilators.

CONCLUSION

Tetanus Neonatorum carries a high mortality. Prevention is better than cure, and education of the public is of vital importance.

Expectant mothers are taught to attend antenatal clinics and, should circumstances permit, delivery should take place in a hospital or clinic. Where this is not possible and the delivery is at home it should be conducted by a doctor or district midwife who will have all the sterile equipment available.

In this way the incidence of tetanus neonatorum would be reduced to a minimum.