

NEONATAL WHOOPING COUGH TREATED BY A MECHANICAL RESPIRATOR USE OF ENGSTROM VENTILATORS IN LONG-TERM TREATMENT

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Respiratory emergencies in small babies can very rapidly prove fatal. The danger was recently underlined by Reid and Tunstall,¹ who measured the changes in the arterial oxygen tension (PaO₂) in 2 premature newborn infants undergoing treatment for periodic episodes of apnoea of obscure cause, where the fall of the PaO₂ was so rapid that, in only 60 seconds, it changed from 78 mm.Hg to the alarmingly low levels of 28 and 30 mm.Hg.

I have not been able to trace reports of blood-gas changes in older babies, but clinical anaesthetic experience suggests that the drop in PaO₂ would be only slightly less rapid. Cardiac arrest is thus an ever-present danger during any such respiratory emergency. Treatment must therefore be sufficiently elaborate to deal adequately with every episode and ensure that near-normal respiration is maintained throughout. An illustrative case in a baby of 1 month, presumably caused by whooping-cough, is quoted.

CASE REPORT

The baby, born by caesarean section, developed coryza when 30 days old. Two days later respiration was, at times, somewhat laboured, and on the 4th night he developed spasmodic attacks commencing with a fretful cry, followed immediately by a type of choking fit, during which he was apnoeic, becoming cyanosed and then grey. After 2 such attacks he was taken to hospital, where he had 4 more attacks, at approximately 2-hourly intervals, and of increasing severity during which mouth-to-mouth respiration was applied and the pulse rate, initially fast, would then drop

precipitously. On one occasion it was counted at 16 beats per minute. The final attack lasted for 30 minutes, during which time the patient went blue whenever mouth-to-mouth respiration was discontinued.

His 2 elder brothers, aged 3 and 4 years respectively, had previously been ill with coughs for 2 weeks before the baby developed his coryza, and by that time the eldest was whooping and had contracted pertussis, while in the other the diagnosis of pertussis was probable. Whooping cough was prevalent in the community at the time, and the intensity of the disease varied greatly even between siblings in this epidemic. Both older children had been immunized.

On examination shortly after the 6th attack, this 8 lb. infant was exhausted, limp but breathing normally. Both sides of the chest moved equally on respiration, the lung fields and bronchial tract were clear, and the mucous membranes pink. Pertussis, although unusual in so young a baby, seemed to be the only likely diagnosis, and this was confirmed by Dr. M. Malk,² Consultant to the Johannesburg City Fever Hospital, who was kind enough to discuss the case with me on the telephone, and advised that prolonged intermittent positive-pressure respiration (IPPR) treatment on the Engstrom ventilator was the safest course, because during subsequent attacks the baby was likely to suffer a cardiac arrest and die. The youngest case that Bradford³ had seen was an infant 2 weeks old. The danger of the disease in early infancy is illustrated by the fact that Cockburn⁴ states that nearly 50% of deaths from pertussis occur in babies under 6 months of age. During 1963 and 1964 Van Hasselt and Van As⁵ of Johannesburg successfully treated 5 babies with pertussis on Engstrom ventilators.

Tracheostomy

Tracheostomy was therefore carried out by Dr. J. S. van der Poel under halothane and oxygen anaesthesia, a 1 mm.

wide longitudinal slit being made through the 2nd tracheal ring after partially dividing the thymus isthmus, and a 4.0 mm. Van Hasselt Neonatal Latex Armoured Tracheostomy tube* inserted. The anterior superior aspect of the cut trachea was then stitched to the skin to overcome extubation difficulties as advised by Smythe.⁶ We also put a nylon stitch on each side of the trachea to act as introducers when inserting the tracheostomy tube, but unfortunately removed them as soon as the tube was in the trachea. In future we intend to leave these 2 sutures *in situ*, in babies, for the first 48 hours to aid reinsertion should the tracheostomy tube accidentally become dislodged in the early stages of ventilatory treatment. One 30-second episode of cyanosis occurred during the induction of anaesthesia due to cardiac depression, probably of a toxic origin, but this responded to pure oxygen IPPR.

When the ventilator was connected to the patient it soon became apparent that a much higher minute-volume was necessary than that calculated from the normogram (4.2 litres/minute instead of 2.53 litres/minute).

Postoperative Management

For the first 8 days of treatment the patient developed periodic episodes of straining, during which inflationary pressures were increased. These attacks usually lasted a few minutes and were interpreted as the same that had brought the child for treatment; however, they gave no cause for alarm during the IPPR treatment and had been absent for 5 days before the patient was removed from the machine. One difficulty was to know when to remove the baby from the ventilator, as from the 8th day he appeared perfectly well. However, Van Hasselt and Van As⁵ strongly advised that, from their experience, treatment should continue for at least 10-14 days, and I followed their advice.

Rectal temperature remained elevated between 100° and 101°F for 2 days and then settled to normal. Spiromycin, 125 mg. *q.i.d.*, was used for the first 8 days, then changed to chloramphenicol, 125 mg. *q.i.d.*, for 5 days, as the daily culture of bronchial secretions, from the 6th day, persistently grew Friedlander's bacillus, non-sensitive to spiromycin. Although Friedlander's bacillus is a commensal of the upper respiratory tract it was felt that the change was advisable. Sedation was carried out with syr. trichloral which proved to be necessary and very successful. Feeding was administered hourly through a polythene nasogastric tube, and vitamins were added. After previous trial runs, the infant was taken off the ventilator on the 12th day and placed in a humidified croupette. The tracheostomy tube was removed on the 13th day, and the child was discharged into his mother's care (she herself being a nursing sister) on the 15th day. At this stage the stoma was closed but not completely covered by skin.

Discussion

Excellent nursing made the whole procedure run almost without incident; the Van Hasselt tracheostomy tubes proved most satisfactory, and the lack of incident on extubation was probably greatly contributed to by the idea of suturing the upper end of the tracheal stoma to skin.⁶

The child made an uneventful recovery, and when seen again a month from discharge, was perfectly well.

Neonatal respiratory emergencies demand immediate relief, and in those giving rise to cyanosis (especially if pallor or an ashen colour is produced) or slowing of the pulse rate, active measures should be adopted. If there is a possibility of such a state of emergency recurring, the minimum precautions should include close day and night observation of the child by a special nurse capable of giving mouth-to-mouth breathing, and the following apparatus should be ready at the cot side: (1) a pharyngeal air way 'resuscitube', (2) a laryngoscope, (3) suction apparatus (4) endotracheal tubes and connections, and (5) inflating bellows and a source of oxygen.

In view of the ease with which the above case was handled, I shall not hesitate to employ tracheostomy and prolonged mechanical ventilation in a future similar case since this method circumvents the dangers inherent in an subsequent episode producing apnoea.

SUMMARY

The importance of prompt, adequate treatment of respiratory emergencies in babies is stressed. A case of pertussis in a month-old baby successfully treated by a mechanical ventilator is described.

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*Made by Latex Products (Pty) Ltd., P.O. Box 4043, Johannesburg.