

SUCCESSFUL ARTIFICIAL VENTILATION FOR SEVEN WEEKS AT ST. LUKE'S HOSPITAL

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Abstract

A girl with acute dermatomyositis was ventilated artificially for seven weeks at St. Luke's Hospital. She was also treated with long term corticosteroids. She was well enough to be eventually discharged home.

She was managed by emergency endotracheal intubation and artificial ventilation. A tracheostomy was carried out. Humidification, physiotherapy and adequate suction of the bronchi were the

mainstay of treatment.

Anaesthetists, though fully trained in this work, are few, and besides having to cope with the other duties in this hospital are handicapped by lack of facilities. Intensive care at present has to be carried out in the ward by nurses and physiotherapists unfamiliar with such cases. Monitoring of blood gases, the acid-base status and ventilation were not possible. The Harlow ventilator was not fully understood by the nursing staff and is not the ideal machine for such a long term of

ventilation. Success in this case was primarily due to the fact that the girl's lungs were normal, while devotion, meticulous care and sheer hard work by all concerned were also instrumental.

We, therefore, stress the importance of a well equipped and maintained respiratory intensive care unit with permanent specifically trained nurses and physiotherapists. This unit should offer a continuous service for recording blood gases and acid-base status.

Introduction

A twelve year old girl with acute dermatomyositis developed the rare complication of ventilatory failure. Ventilation was maintained artificially for seven weeks. She was given long term corticosteroids and she recovered well enough to be discharged home.

Clinical Diagnosis

She was admitted at St. Luke's Hospital on 4 February 1973 as an emergency, unconscious and in ventilatory failure. She also presented with Reynaud's phenomenon and periorbital oedema. She had previously complained of shoulder girdle stiffness and weakness. During weaning muscle contracture was noticed.

Serum enzymes were:

SGOT	70 I.U./litre
Aldolase	7.4. m U./ml
SCPK	98 Sogma units

Management

Emergency endotracheal intubation was carried out and she was ventilated with the Harlow which is a pressure-cycled injector. Since long term ventilation was envisaged, tracheostomy was performed after two days. This facilitated efficient endobronchial suction and eliminated laryngeal complications. Oxygen therapy was given for 28 hours and she was then ventilated with air since she was expected to have normal lung function, and in order to prevent oxygen toxicity to the lung.

Coma and convulsions were due to a

combination of hypoxia with consequent cerebral acidosis, carbon dioxide narcosis, severe electrolyte and water depletion. Electrolyte and water deficit was restored and metabolic acidosis was corrected with sodium bicarbonate. Gastrointestinal distension was controlled by nasogastric aspiration, suppositories, enemas and metoclopramide. In five days she was conscious and free from convulsions. On 10 February she could tolerate an oral diet which restored her electrolyte pattern to normal. Vitamins were supplemented.

We maintained efficient humidification with the nebuliser in order to prevent crusting of the respiratory mucosa and to maintain moist secretions since the normal nasal mechanism was bypassed. Thick secretions lead to bronchiolar blockage and absorption atelectasis.

Chest physiotherapy was carried out assiduously with manual bag inflation and vibration therapy. Secretions were sucked out after physiotherapy or whenever necessary. Results were assessed by the quantity of secretions sucked up, chest auscultation, the degree of difficulty of bag inflation, and by portable chest radiography.

Although sloughing of the tracheal mucosa is inevitable, permanent damage to the tracheal cartilages should not occur. Such complications were prevented by the use of plastic tracheostomy tubes, by ensuring that the cuff was not overinflated and by preventing pulling on the trachea by the weight of the ventilator tubing. The cuff was deflated for a few minutes every hour.

Ampicillin was given empirically as isolation was impossible and no organism was cultured. A no-touch technique was used by staff immediately attending to the patient.

Psychological care was seen to. Full sedation and amnesia were instituted with diazepam. The time of the day was pointed out to the girl. She was spoken to even though she was unable to speak; she was later given pencil and paper. Toys were provided. She was eventually allowed to eat and drink on her own and to sit up in an armchair while still being ventilated.

The relatives were kept in the picture as much as possible.

The nursing staff were uninitiated in the management of such patients. A group of keen student nurses under the supervision of the senior nursing staff ensured continual care for most of the time. They were shown the technique of manual ventilation with a manual inflator bag in case of ventilator failure, or in the event of the patient's 'fighting' the ventilator. The characteristics of the ventilator and humidifier were explained several times.

We strove not to be too rigid with orders to the nurses in order to avoid psychological repercussions — a not uncommon problem.

The Harlow ventilator is a pressure-cycled injector which means that ventilator function depends on lung characteristics. This, when secretions increase airway resistance by diminishing bronchiolar diameter, takes a longer time for the tidal volume to be delivered until the pressure limit is attained. If pulmonary compliance is decreased by total bronchiolar blockage and atelectasis the pressure limit is reached sooner and a lower tidal volume is delivered. This leads to a vicious circle of progressive atelectasis and still lower tidal volumes. It is a ventilator the functions of which are not easily grasped by nurses. A volume-cycled ventilator would have been better.

Since there were no facilities for blood gas and detailed acid-base status measurement, the patient probably survived because of the fact that her lungs were more or less normal, and air provided adequate oxygenation. Moreover a paramagnetic oxygen analyser and a Wright's spirometer were unavailable at the time.

Routine operating theatre work restricted the time we had to supervise care.

Weaning

Towards the end of the period of artificial ventilation the patient had a weak musculature and she required muscle exercises to her limbs in which she had muscle contractures of a mild remediable degree. Weaning proved quite difficult because the period of ventilation was so prolonged. It was attempted initially after ten days but it was soon realised that this was too early. It was attempted again *secundum artem* on 4 May. She was taken off the Harlow for an additional 5 minutes in the hour until completely off, and she was reattached at night. She felt too weak to cooperate and tended to get easily obstructed with secretions. After a prolonged period of three weeks' weaning, the ventilator could be removed completely on 24 May.

Conclusion

Condenser humidification was initiated. After a while she could walk down to the physiotherapy department for treatment. She was discharged home on 19 August.

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