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Letters to the editor

Biphasic cuirass ventilation in an infant with severe respiratory failure

Keiko Nishiyama[1], Makiko Komori[1], Toshiro Sato[2], Izumi Kondo[1], Yu Suzuki[3], Haruka Kominami[3], Kanako Tsukamoto[1], and Miwako Kawamata[1]

[1]Department of Anesthesiology, Medical Center East, Tokyo Women's Medical University, 2-1-10 Nishiogu, Arakawa-ku, Tokyo 116-8567, Japan

[2]Department of Clinical Engineering, Medical Center East, Tokyo Women's Medical University, Tokyo, Japan

[3]Department of Pediatrics, Medical Center East, Tokyo Women's Medical University, Tokyo, Japan

To the editor: Few studies have reported the effect of biphasic cuirass ventilation [BCV] [1–3] in infants. BCV is a non-invasive, ideal technique for mechanical ventilation that overcomes the shortcomings of conventional mechanical ventilation. Moreover, BCV prevents complications associated with endotracheal intubation, and patients can have conversations and eat meals while receiving BCV. When used in infants, BCV permits attachment between children and their mothers. We describe our experience with a male infant with chronic pulmonary disease associated with severe respiratory failure who responded well to BCV.

Mechanical ventilation was performed for 3 days after birth in a 1367-g-weight infant, who was born with transient tachypnea at 29 weeks of gestation. Supplemental oxygen was given until 34 days after birth. The infant was in the neonatal intensive care unit until 39 weeks of age corrected for gestation. At discharge from the neonatal intensive care unit, chest radiography showed that atelectasis of the upper right lobe persisted, in association with emphysema-like changes. Wilson-Mikity syndrome was thus diagnosed. Bronchiolitis caused by rhinovirus developed 4 months after birth, and mechanical ventilation was needed. Airway pressure release ventilation (APRV) [4, 5] was therefore performed for about 2 weeks. At the introduction of APRV, the patent's airway pressure was maintained at 28 cmH_2O to prevent retraction of the chest wall. The lung collapse and hypoxemia were attenuated. The trachea was therefore extubated. Nasal non-invasive positive-pressure ventilation was first performed to treat the persisting atelectasis. Stable positive pressure was not achieved because of a poorly fitting nasal mask. A skin ulcer developed at the site of attachment, interfering the infant's feeding. Two weeks after the extubation, BCV was started, with the use of a Respiratory Therapy External (RTX; Medivent, London, UK) device. Airway pressure was maintained by the intermittent use of continuous negative pressure. Four weeks after extubation, however, bronchiolitis due to respiratory syncytial virus developed. The infant again

Fig. 1. Photograph of an infant receiving biphasic cuirass ventilation while drinking milk from a nursing bottle

required mechanical ventilation and received APRV for 8 weeks. Then, BCV continuous negative pressure was again intermittently applied. Because of the chronic respiratory disorder, continuous negative pressure was used while the infant was nursing. Sputum removal was promoted by performing BCV in the clearance mode. Then a continuous negative pressure of –7 cmH_2O was applied for 24 h to expand the thorax. Respiratory muscle retraction subsided, and the atelectasis showed marked attenuation on chest X-ray films. The infant was able to become attached to his mother and drink milk from a bottle while wearing the appliance; his nutritional status was good (Fig. 1). Six weeks after the reintroduction of BCV, mechanical ventilation was no longer needed, even while the infant was nursing.

As compared with other types of noninvasive mechanical ventilation, BCV is easily fitted to the patient and does not require sedation. BCV can also be used intermittently as physical therapy and is easily accepted by the hospital staff, as well as by patients' families. We are now assessing the possibility of performing BCV at home in infants who have acute respiratory infections.

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Address correspondence to: M. Komori
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