

Affiliate Posters

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High Frequency Percussive Ventilation in the Management of Acute Asthma

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INTRODUCTION: High frequency percussive ventilation (HFPV) is a modality that delivers pneumatically powered, pressure limited, time cycled and flow-interrupted breaths with biphasic oscillation. This mode of ventilation is provided solely by the volumetric diffusive respirator (VDR). We report a case of a young male admitted with a severe asthma attack who was successfully managed using the VDR.

CASE PRESENTATION: A 30 year male with history of childhood asthma was admitted with dyspnea, wheezing, and flu like symptoms for 3 days and was requiring his inhaled bronchodilators frequently. He denied recent travel or sick contacts. He was febrile and tachypneic on arrival to the emergency department. He received bronchodilators and intravenous corticosteroids with minimal improvement in symptoms. He was admitted to the intensive care unit and his arterial blood gas (ABG) showed evidence of acute respiratory acidosis with severe hypoxemia. Subsequently, he was intubated and placed on conventional mechanical ventilation. A nasopharyngeal swab returned positive for

influenza A, and he was placed on respiratory isolation and treated with oseltamivir. His ABG continued to show evidence of worsening respiratory acidosis and he also demonstrated dys-synchrony with the ventilator resulting from intrinsic positive end expiratory pressure (iPEEP). He was sedated and paralyzed in an attempt to improve synchrony, but he continued to have high oxygen requirements. He was also noted to have thick secretions as well as small lung volumes on chest-x-ray. A high risk for bronchospasm precluded bronchoscopy and heliox could not be utilized as oxygen requirements remained above 60%. A decision was made to place the patient on VDR resulting in the mobilization of 150ml of thick mucus plugs. The patient gradually improved while on VDR and was extubated within four days.

DISCUSSION: HFPV through VDR creates a high flow shock wave of inspiratory gas that generates a simultaneous expiratory counter flow of gas. This consequently creates a sustained cephalad flow which helps with the removal of secretions and the displacement of trapped gas. Our patient had severe bronchospasm and thick mucus plugs obstructing the bronchi resulting in an inability to oxygenate or ventilate adequately. VDR is used to facilitate mobilization of secretions and to lower the peak airway pressures. HFPV delivered by the VDR, effectively improved oxygenation and ventilation in our patient who was otherwise unresponsive to the conventional modes of ventilation. Our case is one of the only reported cases of severe asthma causing acute respiratory failure that was successfully treated with VDR.

CONCLUSIONS: The subsequent recovery of our patient with severe acute asthma and respiratory failure may

encourage others to try HFPV delivered through VDR when the traditional mechanical ventilation strategies fail.

Reference #1 Mabe TG, Honeycutt T, Cairns BA. High-frequency percussive ventilation in a patient with hydrocarbon aspiration. 2007 *Pediatr Crit Care Med*. Jul;8(4):383–5

Reference #2 Paulsen, SM, Killyon, GW, & others. High-Frequency Percussive Ventilation as a Salvage Modality in Adult Respiratory Distress Syndrome: A Preliminary Study *The American Surgeon*, 2003. Vol 68 (10): 852–856

Reference #3 Improved Oxygenation and Ventilation: Perfusion Matching with Volumetric Diffusive Respiration as Compared to Conventional Mechanical Ventilation. Mikeska, BW & others. 2002. *Chest*, vol 16, No. 4 (Suppl) S62

DISCLOSURE: The following authors have nothing to disclose: Lavanya Kodali, Emile Klada, Ruchi Bansal, Adebayo Esan, Felix Khusid, Suhail Raof

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