

The Utilization of Independent Lung Ventilation Via High Frequency Percussive Ventilation (HFPV) During Extracorporeal Membrane Oxygenation (ECMO)

Kenneth Miller MEd, MSRT, RRT-ACCS, NPS, AE-C, FAARC
Lehigh Valley Health Network, Kenneth.Miller@lvhn.org

Rita Pechulis MD, FCCP
Lehigh Valley Health Network, Rita_M.Pechulis@lvhn.org

James K. Wu
Lehigh Valley Health Network, james.wu@lvhn.org

Chad Traub RRT-ACCS
Lehigh Valley Health Network, Chad_J.Traub@lvhn.org

Dorothea T. Watson DO
Lehigh Valley Health Network, Dorothea_T.Watson@lvhn.org

Follow this and additional works at: <https://scholarlyworks.lvhn.org/patient-care-services-nursing>

 Part of the [Cardiology Commons](#), [Nursing Commons](#), and the [Surgery Commons](#)

Published In/Presented At

Miller, K., Pechulis, R., Wu, J., Traub, C. & Watson, D. (2014, December, 8). *The Utilization of Independent Lung Ventilation Via High Frequency Percussive Ventilation (HFPV) During Extracorporeal Membrane Oxygenation (ECMO)*. The poster session presented at the American Association of Respiratory Care International Congress, Las Vegas, NV.

This Poster is brought to you for free and open access by LVHN Scholarly Works. It has been accepted for inclusion in LVHN Scholarly Works by an authorized administrator. For more information, please contact LibraryServices@lvhn.org.

The Utilization of Independent Lung Ventilation Via High Frequency Percussive Ventilation (HFPV) During Extracorporeal Membrane Oxygenation (ECMO)

Kenneth Miller MEd, RRT-ACCS, Rita Pechulis MD, James Wu MD, Chad Traub RRT-ACCS, Dorothea Watson MD
Lehigh Valley Health Network, Allentown, PA

Introduction

- During the ventilation of patients with ARDS one of the primary goals is to minimize ventilator induced injury.
- If the oxygenation end-point cannot be achieved by conventional ventilation, ECMO may be initiated.
- Ventilatory management becomes even more complex when each lung exhibits different etiologies.
- Management is especially challenging when the pathologic process differs from right lung to left lung.

Case Study

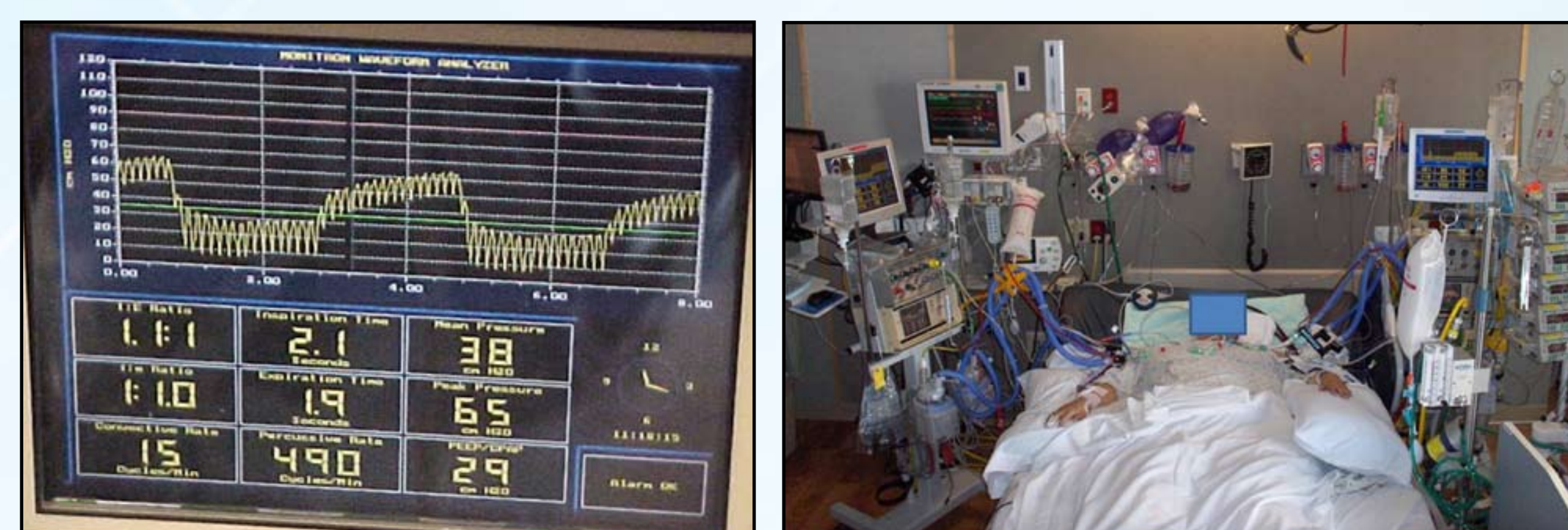
- We describe a case study of a patient with H1N1 influenza and ARDS requiring ECMO who developed multiple pneumothoraces of the right lung and significant consolidation in the left lung. To adequately manage the patient, independent lung ventilation (ILV) was provided by two Volumetric Diffusive Respirators (VDR).

Methods

- A twenty four year old female was admitted with H1N1 influenza which progressed to ARDS requiring ECMO. On day fourteen the patient developed a right pneumothorax which was decompressed via tube thoracostomy.
- Two days later, pneumothorax reoccurred on the right necessitating placement of another chest tube with significant air leak. Gas exchange deteriorated (ABG 7.01/75/42) oxygenation and sweep gas were maximized via ECMO with marginal improvement. Radiographic imaging revealed an increasing pneumothorax of the right lung and increasing consolidation of the left lung.
- The decision was made to institute independent lung ventilation with two VDRs via dual lumen endotracheal tube. The reason HFPV was selected as a ventilator strategy was to provide lung protection to the injured right lung (low pressure/PEEP/percussive force), while providing aggressive mucokinesis for the obstructed left lung (high pressure/PEEP/percussive force).
- ECMO settings remained at 100%/10LPM sweep.

High Frequency Percussive Ventilation

- Classified as:
 - pneumatically driven
 - pressure limited
 - time cycled
 - high frequency flow interrupter
 - delivers high frequency in a range of 200-900 cycles
 - exhalation is passive



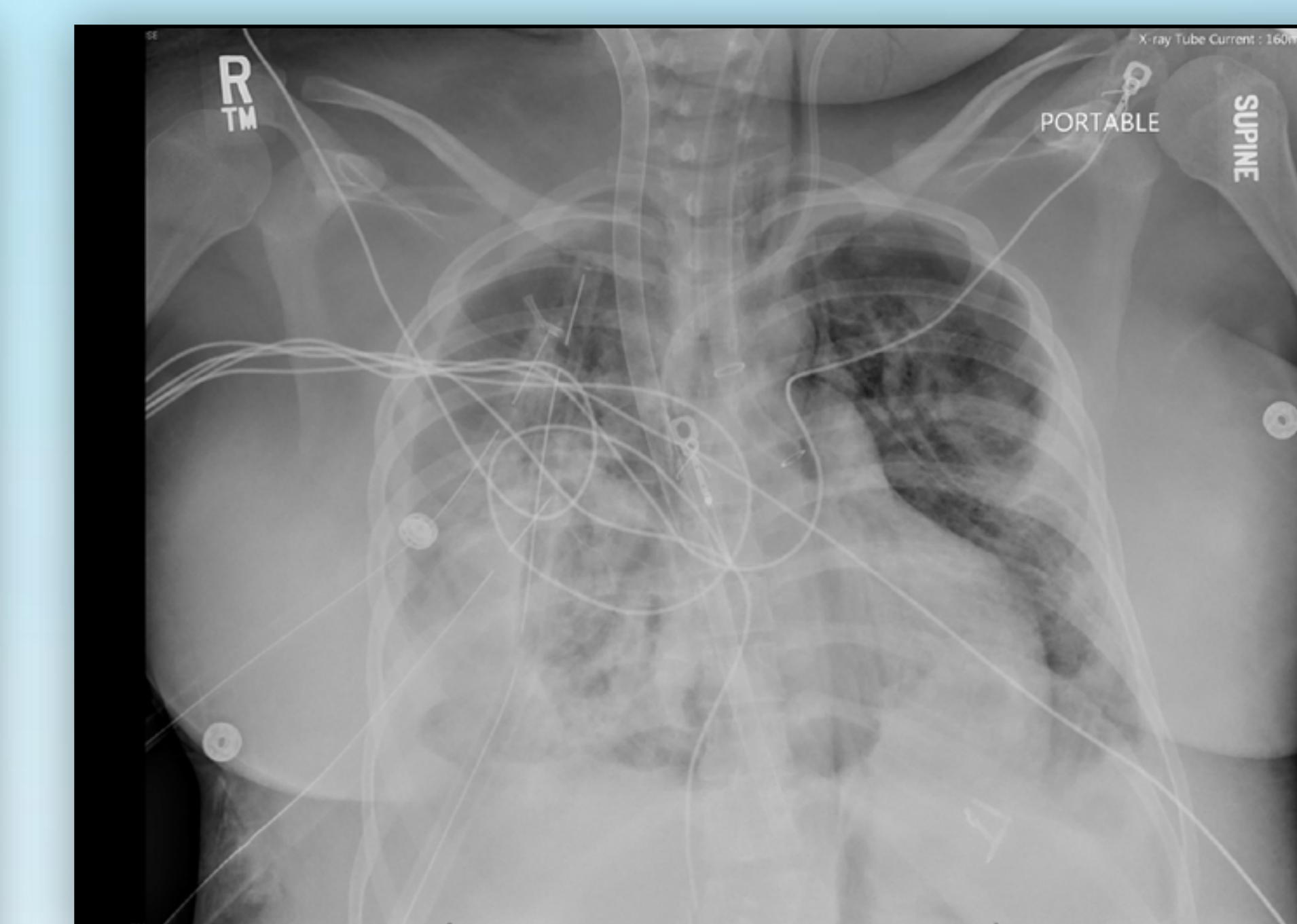
Images



Pre independent lung ventilation



12 hrs. post independent lung ventilation



48 hrs. post independent lung ventilation

Results

- Within forty-eight hours gas exchange had improved (ABG 7.32/48/76) and ECMO parameters were weaned to 80%/5 LPM sweep.
- Subsequently the patient was transitioned to conventional ventilation via single lumen endotracheal tube with no deterioration in gas exchange.
- Radiographic imaging revealed an improvement in left lung consolidation.



24 hrs. post transition



© 2014 Lehigh Valley Health Network