

The Utilization of a Non-Invasive Ventilator to Compensate for Chest Tube Leak During Extracorporeal Membrane Oxygenation

Kenneth Miller MEd, RRT-ACCS

Lehigh Valley Health Network, Kenneth.Miller@lvhn.org

Kimberly D. Smith RRT-ACCS

Lehigh Valley Health Network, Kimberly_D.Smith@lvhn.org

Dave Marth RRT

Lehigh Valley Health Network, David.Marth@lvhn.org

Christine McCullough RRT

Lehigh Valley Health Network

Susan Carvin RRT-ACCS

Lehigh Valley Health Network, Susan_M.Carvin@lvhn.org

See next page for additional authors

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

 Part of the [Nursing Commons](#)

Published In/Presented At

Miller, K., Smith, K., Marth, D., McCullough, C., Carven, S., Watson, D., Pechulis, R. (2015, November 7). *The Utilization of a Non-Invasive Ventilator to Compensate for Chest Tube Leak During Extracorporeal Membrane Oxygenation*. Poster presented at: AARC International Congress, Tampa, FL.

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.

Authors

Kenneth Miller MEd, RRT-ACCS; Kimberly D. Smith RRT-ACCS; Dave Marth RRT; Christine McCullough RRT; Susan Carvin RRT-ACCS; Dorothea T. Watson DO; and Rita Pechulis MD, FCCP

The Utilization of a Non-Invasive Ventilator to Compensate for Chest Tube Leak During Extracorporeal Membrane Oxygenation

Kenneth Miller MEd, RRT-ACCS, Kimberly Smith RRT-ACCS, Dave Marth RRT, Christine McCullough, RRT, Susan Carven RRT-ACCS, Dorothea Watson DO, Rita Pechulis MD
Lehigh Valley Health Network, Allentown, Pennsylvania

Introduction

- Maintaining lung inflation during Extracorporeal Membrane Oxygenation (ECMO) is a critical part of the patient's clinical management.
- The goal of ECMO is to minimize ventilator induced trauma
- Despite lung protective ventilation, ventilator injury can still occur
- If large air leaks develop clinical progression may be limited.
- A fifty year old male was admitted with cavitation Pneumonia with refractory hypoxemia.
- Despite aggressive conventional ventilatory management, gas exchange failed to be optimized resulting in the need for V-V ECMO cannulation. Despite the utilization of lung protective ventilation the patient developed pneumothoraces of the right lung resulting in several chest tubes needing to be placed.

Methods

- Prolonged paralytic administration, daily bronchoscopies, and placement on High Frequency Percussive Ventilation (VDR-4)* were required to maintain stable gas exchange despite maximizing ECMO parameters.
- Attempts to remove paralytic administration and transition from HFPV resulted in gas exchange deterioration and increase in chest tube air leak. On ventilator day 38 attempts were made to place back on conventional ventilation to reduce the administration of the paralytic.
- The transition to conventional ventilation failed to provide ventilation secondary to the large chest tube leak, which caused ventilator malfunction. Leak compensation via conventional ventilation failed secondary to chest tube leaks greater than 25 liters.
- Also the ability to track ventilatory parameters was diminished , along with continuous activation of leak compensation alarming.
- Decision was made to use the V-60** to maintain lung inflation, reduce paralytic administration and minimize chest tube leak.

Results

- The Chest tube leak was reduced from 25 liters to approximately 3-5 liters with no deterioration in gas exchange. (Table 1)
- An additional benefit was that the patient was able to generate triggered spontaneous breaths for the first time since being ventilated thirty eight days ago.
- The ability to track exhaled volumes was enhanced.
- Continuous leak compensation alarms were minimized.
- Gas exchange was maintained



*Percussionaire-Sandpoint, Id.



**V-60 Phillips-Carlsbad, CA

	Chest Tube Leak	ABG	% Spontaneous Breaths	ECMO Parameter
Conventional Ventilation	>25 liters	7.42 - 41-66	0%	100%/8 lpm
V-60	3-5 liters	7.41 - 40-69	50%	100%/7 lpm

Discussion

- Chest tube leak was minimized and fistula was able to seal
 - Reduced loss of delivered volume through chest tubes
- Spontaneous breathing was achieved
 - Triggering sensitivity was enhanced and maintained secondary to Auto-Trak*** via V-60
- Alarm fatigue was reduced
 - Leak compensation and low volumes alarms were minimized
- Ability to monitor gas delivery was enhanced
 - Exhaled volumes will able to be observed and monitored

***Auto-Trak technology is designed to address the specific challenges of NIV. By providing auto-adaptive leak compensation, inspiratory triggering, and expiratory cycling, Auto-Trak delivers optimal synchrony in the face of dynamic leak and changing patient demand.

Conclusion

- In the presence of large chest tube leaks, conventional ventilators may fail to ventilate adequately or trigger patient spontaneous efforts.
- Inability to monitor exhaled volumes may also be problematic.
- Alarm fatigue and loss of ventilatory monitoring was diminished.
- In this case scenario the V-60 allowed for stable gas exchange in the presence of a large chest tube leak with minimal alarms and monitoring issues.

© 2015 Lehigh Valley Health Network

A PASSION FOR BETTER MEDICINE.™

610-402-CARE LVHN.org