Setting Optimal Positive Expiratory Pressure Utilizing Transpulmonary Monitoring and a Pressure Volume Measurement.

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Published In/Presented At

Miller, K. Reis, M. Marth, D. Kakumanu, N. (2017, October 3). *Setting Optimal Positive Expiratory Pressure Utilizing Transpulmonary Monitoring and a Pressure Volume Measurement.* Poster Presented at: The American Association of Respiratory Care (AARC), Innapolis, Indiania.

Setting Optimal Positive Expiratory Pressure Utilizing Transpulmonary Monitoring and a Pressure Volume Measurement

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INTRODUCTION

- Setting optimal positive end expiratory pressure (PEEP) is beneficial in improving gas exchange, promoting alveolar inflation, and minimizing ventilator induced trauma.
- The setting of PEEP has historically been done many different ways, FIO_2/PEEP algorithmic approach, compliance assessment, etc.
- Recently, we have employed the use of trans-pulmonary monitoring along with a pressure/volume measurement (P/V) to set the optimal PEEP.
- By utilizing both of these strategies the optimal PEEP can be set to maximize clinical objectives.

METHODS

- We inserted an esophageal balloon (Cooper Surgical, USA) to monitoring TranspE.
- We performed a pressure/volume(G-5 Hamilton Medical, Switzerland) to determine the lower inflection point on twelve patients diagnosed with severe to moderate ARDS. (Berlin definition)
- All patients were sedated and placed on a paralytic infusion.
- Esophageal balloon placement was verified via ventilator waveform and chest X-ray.
- Our goal was to set the PEEP to maintain a TranspE between -2 to +2cm/H2O and 2 cmH2O above the lower inflection point via the P/V measurement (G-5 P/V Tool).

Post esophageal balloon placement.

Peak airway pressure minus esophageal pressure equals: Transpulmonary pressure (pressure the lung is receiving) Goal<25 cm

Note peak airway pressure is 42cm
Esophageal pressure 21cm thus transpulmonary pressure (the lung receiving) only 19cm

PEEP set at 14cm
Based on PtransE
Between =2 to +2cm

RESULTS

- In nine of the patients the optimal PEEP was the same via the TranspE and P/V measurements. (Table 1)
- In three patients, all >125kg there was a greater than 4cm/H2O difference between the TranspE and P/V measurement lower inflection (LIP) point regarding the optimal PEEP setting.
- On these three patients we set the PEEP between the two measurements and assessed clinical performance.
- Post PEEP setting in all twelve patients Transpl was maintained<25cm/H2O and hemodynamic performance remained stable.

Table 1. TranseP and P/V Measurements

Wt/Kg	TranspE cm/H_2O	LIP cm/H_2O	PEEP Set cm/H_2O
95	-1.5	14	16
150	+6	20	17
80	+1	12	14
55	-2	12	14
75	+2	10	12
110	-2	16	18
175	-6	16	22
130	-4	18	20
92	+1	12	14
89	-2	12	14
105	+1.5	14	16
72	-1	10	12

CONCLUSIONS

- Based on our experience, we believe utilizing both transpulmonary monitoring and pressure volume measurements can determine the optimal PEEP.
- Factors in chest wall impedance may cause a difference in these measurements and enhanced clinical assessment should be utilized to determine the optimal PEEP in that patient population.
- The effect of these measurements on mortality and morbidity still needs to be determined.