



September Up 2 Date

Pressure Control Ventilation

Introduction

Ventilators offer many different options for providing mechanical ventilation. While multiple studies have been performed to determine a benefit of the use of one type of ventilation mode over another, more data is needed to show a clinical significance. Mechanical ventilation, like other treatment modalities, must be tailored by the provider to meet the needs of a specific patient. This article will discuss pressure control ventilation; its advantages and disadvantages, mechanics, and comparison specifically to volume control mode of ventilation.

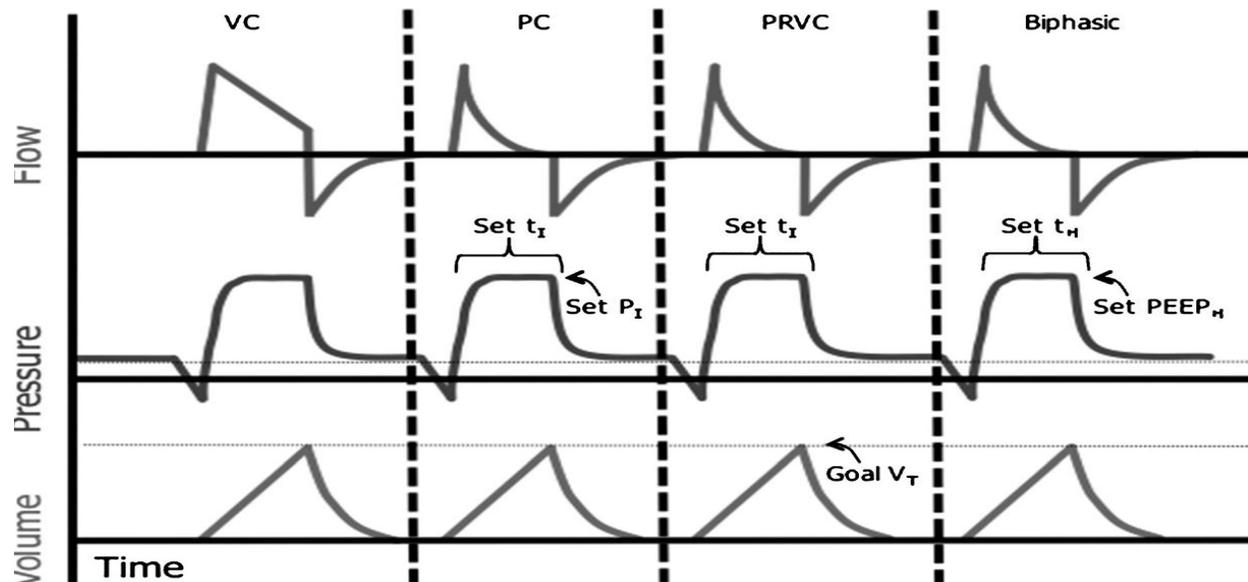
Discussion

Pressure modes of invasive mechanical ventilation generate a tidal breath by delivering pressure over time. Pressure control ventilation is the prototypical pressure mode. PCV is patient or time triggered, pressure limited and time cycled. Pressure control requires the clinician to set an inspiratory pressure and inspiratory time rather than an inspiratory flow and tidal volume. Flow is determined by the machine, tidal volume is a consequence of the set pressure, set time and the patient mechanics (resistance and compliance) (1). Pressure control mode can be used to deliver fully supported breaths using an assist control or SIMV strategy.

When compared to volume control type of mechanical ventilation, pressure control has several differences. Pressure modes, as opposed to VC modes, generate a tidal breath by delivering pressure over time. Pressure is the primary parameter used to deliver the tidal breath. Both modes are patient or time triggered, but VC mode is characterized by flow limitation and volume cycling as opposed to pressure limitation and time cycled in PC. The ventilator in VC mode delivers gas at a set flow rate and pattern until the set tidal volume is achieved (1). Pressure control ventilation may offer particular

advantages in certain circumstances in which variable flow rates are preferred or when pressure or volume limitation is required. One specific study did show that PIP, mean airway pressure and CVP in a PC group was lower than that of the VC group. In addition the incidence of pressure injury in the PC group was zero while it was 10% in the VC group (2). Other studies have also shown that in patients with acute hypoxemic respiratory failure, changing from a VC mode to PC mode may result in lower peak airway pressures (3, 4).

There are other factors to consider with regards to pressure control and volume control modes. Increasing tidal volume by increasing driving pressure or inspiratory time may increase minute ventilation and thereby lower PaCO₂. If these changes result in auto-PEEP tidal volume may not increase as expected and may actually fall. Because PC limits the maximum airway pressure delivered to the lung the result can be a variable tidal and minute volume (1). Several studies have shown a lower work of breathing and improved comfort for patients with an increased and variable respiratory demand (5, 6). A visual representation of the differences in between several modes can be illustrated as follows:



Conclusion

Pressure control mode is useful in a variety of situations. This would include patients with acute hypoxemic respiratory failure, ARDS, and patients with any type of lung injury. Pressure control may also help in patients with an endotracheal tube cuff leak. Any type of patient who may suffer detriment from elevated inspiratory pressure should be in a pressure-limiting mode.

References

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