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Editorial

Adaptive Support Ventilation

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Editorial

Mechanical ventilation is commonly used in the intensive care units. The main objective is to provide ventilation and oxygenation. It provides comfort to the patient by decreasing the work of breathing [1]. Today, there are several modes of mechanical ventilators that can reduce the adverse side effects of the mechanical ventilation leading to improved patient outcomes.

The adaptive support ventilation, commonly written as ASV, is a fairly novel concept in mechanical ventilation [2]. It was first developed by Laubscher et al. in 1994 and became commercially available in 1998 [3,4]. It is regarded as one of the most advance modes of mechanical ventilation. Adaptive support ventilation is a form of closed-loop mode of minute ventilation. It adjusts the ventilator on the basis of patient's lung dynamics and breathing efforts [5]. The aspiratory pressure is adjusted according to the Otis equation, to have the desired tidal volume for minimum work of breathing [5]. In the ASV mode, the ventilator continuously monitors the lung mechanics of the patient and changes its setting according to that. The mode switches between the controlled breaths and supportive breaths based on the presence or absence of spontaneous breaths by the patients [5]. More tidal volume is given than dead space in this mode, to prevent hypoventilation. Upper tidal volumes are not given to prevent barotraumas [2,3,6]. The ventilator on the ASV mode needs less supportive ventilation and less control by the ventilator operators [2,3,7].

Many research studies have documented the advantages of adaptive support ventilation mode in clinical settings. A prospective randomized controlled trial by Sulzer et al supports the use of ASV mode of mechanical ventilation in post-cardiac surgery patients [8]. The study reports less time on mechanical ventilation in the ASV mode compared with the SIMV and Pressure Supports (PS) modalities [8]. Another study by Petter et al, reported similar outcomes post-extubation form ASV and SIMV+PS modes, but reports fewer alarms an fewer ventilator manipulations on the ASV mode [7]. Studies have also regarded the ASV mode safer compared to the SIMV+PS mode [9]. The safety and usefulness of ASV is also supported by Dongleman et al, who conducted a randomized controlled trial and included patients with post-coronary bypass grafting status [9]. The study however finds similar extubation time between ASV and PCV/ pressure support mode of ventilation [9]. ASV has also been regarded as the preferred mode of weaning the patients from mechanical ventilation. Kirakli et.al conducted a randomized control trial comparing the ventilation duration between ASV and P-ASV modes in ICU patients [10]. The study reports a reduced total mechanical ventilation duration with the ASV mode compared with the latter. This shorter duration of the total mv period was due to the shorter weaning period in the ASV setting, and also because of the shorter ventilation time between intubation and the weaning period [10]. The authors of the study also reports additional advantages of the ASV mode [10]. ASV mode shows automatic switching to the PAV mode when it detects spontaneous breaths by the patient, thus offering an added benefit over other modes. The study results demonstrate significantly shorter duration of the total MV, weaning and the median mv duration until weaning ($p \leq 0.03$) in the ASV mode, with significantly higher number of patients successfully extubated on the ASV mode ($p=0.001$) [10].

Adaptive support ventilation mode has been regarded as a user-friendly mode that is cost-effective in terms of needing less ICU personnel and ventilator operators [3].This mode of mechanical ventilation also reduces the healthcare expenses by decreasing the overall incubation time with less clinical interventions [3]. Studies have evaluated the ASV mode in a variety of patients with chronic pulmonary disease. The study findings from Bellatio et al, outlines the ASV mode strategy in different clinical scenarios [11]. The author reports that in patients receiving mechanical ventilation in the ASV mode, the ventilator settings were close to the normal lung physiology in the post-operative patients with normal lungs [11]. In patients with chronic obstructive pulmonary disease, the ASV mode selected a pattern with expiratory time and in patients with restrictive lung disease, a pattern with low tidal volume was selected. The study concluded that the ASV mode can select adequate ventilator patterns for a broad range of pulmonary conditions [11].

Adaptive support ventilation mode also shows several limitations. The data on the use of ASV in pediatric age group is still very limited. Also, VT, I: E ratio and RR are not directly programmed in ASV [2].Despite of these limitations, ASV is becoming popular over conventional ventilation modes. In addition of being safe and easy mode to operate, it requires less human participation for its settings and adjusts according to the patient's respiratory efforts [2]. Because it takes account of the spontaneous breathing pattern, it prevents auto-PEEP, tachypnea and dead space ventilation [2]. By decreasing the overall time of mechanical ventilation, ASV mode assists in early discharge from the ICU that leads to reduced healthcare cost and improved overall quality of life [2]. There is a need to conduct more prospective randomized clinical trials using ASV as a mode of mechanical ventilation in wide range of pulmonary conditions and clinical scenarios to confirm its efficacy in reducing the incubation time, duration of mechanical ventilation, ICU cost and mortality.

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