Letters to the Editor

The effects of adaptive servo-ventilation in the management of acute cardiogenic pulmonary edema: Definitely more than a blurb

Acute cardiogenic pulmonary edema (CPE) is defined as pulmonary edema due to increased capillary hydrostatic pressure secondary to elevated pulmonary venous pressure because of cardiac dysfunction. In-hospital mortality rates are closely related to the underlying causes and severity of the disease and may be as high as 15–20%. Continuous positive airway pressure ventilation (CPAP) and non-invasive positive pressure ventilation (NPPV), with their unique combination of respiratory and hemodynamic effects, are a cornerstone of the management of CPE. Both techniques accelerate the remission of symptoms and the normalization of blood gas parameters, reduce the need for endotracheal intubation (ETI), and are associated with a trend toward lesser mortality when compared to standard medical therapy [1]. Several publications support the notion that their early introduction, already in the prehospital setting, may add further beneficial effects [2]. As clearly stated in most recent guidelines, positive intrathoracic pressure must be seen as a nonpharmacological form of treatment of acute CPE in selected patients rather than only a supportive measure [1].

Adaptive servo-ventilation (ASV) at home has been long used for patients with chronic heart failure (HF) and sleep disorders. Current evidence is that it has more favorable acute effects on hemodynamics than CPAP in HF patients with markedly better compliance [3]. However, the safety and efficacy of ASV in the setting of chronic HF is still a matter of debate. Even fewer are the data on the effects on acute CPE.

The study by Kinosita and co-workers, reported in this issue of the Journal, aimed to elucidate the effect of early ASV use in the emergency room in patients with acute CPE [4]. These authors concluded that rapid introduction of ASV reduces the need for ETI and decreases the hospitalization period.

This intriguing study is timely; nevertheless, several limitations apply. First, it has a retrospective design, as fully disclosed by the authors in the study limitations paragraph. It would be important to know if data were prospectively collected or data mining was also retrospectively performed at the time of analysis. Second, at least two study features may deserve further consideration. The first one is the definition of CPE that does not perfectly fit with current international standards and the second refers to the standard medical therapy approach. Indeed, CPE management algorithms, which exclude NPPV as first-line treatment before ETI, do not comply with current guidelines. This brings to the third limitation: were study groups homogeneous? The significantly higher rates of atrial fibrillation and a nearly 10% higher incidence of new onset HF portend subtle differences in etiology and, more importantly, different pathophysiological patterns of presentation. The authors are to be commended on their efforts to describe clinical scenarios at admission but again an issue on the accuracy of the dataset still hamper study conclusions. Indeed, how many patients could be really diagnosed as having CPE? In fact, a growing body of knowledge clearly portends that “future management should look beyond clinical risk scores to an understanding of etiology and pathophysiology in each patient to provide optimal treatment for this deadly condition” [5]. A more in-depth knowledge of baseline patient characteristics and their hemodynamic and respiratory features at hospital admission is mandatory to guide treatment and, eventually, to compare supposedly alternative therapeutic strategies. All in all, the study adds to the current knowledge as far as it suggests that inherent technical characteristics make ASV easy to use and provide seamlessly support from the hospital’s door to even patients’ home and back. Larger studies on better-defined patient subsets and adopting state-of-the-art treatment algorithms and modalities are certainly needed to evaluate the potential of this user-friendly ventilator support modality. The time has come for a prospective comparison between CPAP and ASV.

Conflict of interest

The authors declare that there is no conflict of interest.

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References


Author’s reply

We thank Esquinas et al. for their interest in our study [1]. Acute cardiogenic pulmonary edema (ACPE) often requires mechanical ventilation and the in-hospital mortality rate is high. Noninvasive positive pressure ventilation (NPPV) significantly decreases mortality and reduces the rate of endotracheal intubation (ETI) in patients with ACPE [2]. Adaptive servo-ventilation (ASV) can be used seamlessly from the hospital’s door to the general ward, and occasionally at home. In addition, favorable acute effects of ASV are reported in heart failure (HF) patients [3]. ASV has better compliance than continuous positive airway pressure (CPAP) or bi-level-positive airway pressure (BiPAP) [4].

In our study, we evaluated the effect of ASV use in the emergency room in patients with ACPE. In patients with ACPE, rapid introduction of ASV in the emergency room reduced the need for ETI and decreased the hospital period.

We agree with comments of Esquinas et al. that our study has several limitations. Our study was a retrospective study and potential bias depending on the physician was not absolutely excluded. However, hemodynamics, laboratory data, echocardiographic data, oxygen flow rate in the emergency room, and medications during hospitalization were not different among the groups. ACPE was defined according to the guideline of the Japanese Circulation Society (JCS) (dyspnea, orthopnea occurred and we heard a moist rale. Pulmonary edema was shown by radiograph). All patients in our study were really diagnosed as having ACPE. In the guideline of the JCS, NPPV is the first line of treatment for ACPE. Of course, we introduced ASV or conventional NPPV before ETI in almost all cases except in cardiogenic shock and disturbance of consciousness.

It is important to understand etiology and pathological mechanisms for management of HF because etiology of HF and cardiac rhythm affect cardiac response to CPAP on acute phase [5]. In particular, it is reported that atrial fibrillation (AF) decreases cardiac index. In our study, the prevalence of AF was significantly higher in the ASV group. This is a limitation of a retrospective study that was not randomized. Although the condition in ASV group might be worse than that in the control group, ASV was effective in patients with such a background. However, as Esquinas et al. suggested, it would be important to know if data were prospectively collected or data mining was also retrospectively performed at the time of analysis, such as propensity score match would be needed for better match of background.

We also hope that a large, prospective study comparison between CPAP and ASV will be started. Finally, we hope that our reply will address the problems that Esquinas et al. suggested. Once again, we would like to appreciate his interest in our study.

References


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