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CORRESPONDENCE

Different spontaneous breathing trials in patients with atrial fibrillation



Dear Editor,

Every year worldwide demand on ICU's increases, and so does the need for mechanical ventilation (MV) through an endotracheal tube (ET). Once placed that ET will sooner or later have to be removed and the weaning procedure started. As Tseng et al.¹ have pointed out weaning from mechanical ventilation is one of the most challenging and worrying problems in the ICU. The withdrawal time used takes up more than 40% of the overall MV period of time and it sometimes fails. Using spontaneous breathing trial (SBT) as method for decision making for weaning is a great help to the clinician in achieving his goal. T-piece, pressure support ventilation (PSV) + peep and PSV + zeep are among the SBT methods. The problem is choosing the right method for a specific patient (with his/her medical record) and in specific clinical conditions.

Tseng et al.¹ in their one year retrospective study (01/2014–01/2015) $N=148$, compare the effect of different SBT's (T-piece vs PSV) on Atrial Fibrillation (AF) patient ($N=66$) vs non-atrial fibrillation condition ($N=82$) in order to establish the best weaning trial when managing the most common arrhythmias in the ICU. The target, as always, is to try to reduce the MV time and so the length of stay in the ICU and the hospital and of course the mortality rate by avoiding weaning failure.

Atrial fibrillation is not only the most frequent arrhythmia but also the one most likely to contribute to heart failure. The effects on the hemodynamic when positive pressure on airway is applied are well known; during tidal ventilation the increase in transpulmonary pressure will induce on the right heart chambers a increase in the afterload and a decrease in the systemic venous return and the preload, on the left heart the effect is the opposite improving left ventricle preload and reducing the afterload so increasing the left ventricle stroke volume (LVSV). Summing up and when the hemodynamic state of the patient is balanced, the tidal ventilation

improves the left ventricle output and reduces the right one.² When weaning a patient with AF our first therapeutic option must be aimed at controlling the arrhythmia and the secondary heart failure so as to avoid weaning failure. Nowadays, when there is no other option, we could perform the SBT but in these cases we must pay close attention to the patient's hemodynamic state (balanced vs not balanced) in order to get the heart compensation by the use of positive pressure on airway. The average calculation of the diastolic dysfunction through the E/A ratio, the inferior vena cava (IVC) distensibility index, the ejection fraction and velocity time integral (VTI) using echocardiography in association with passive leg's rising will help on this issue. Once the patient is haemodynamically balanced the tidal ventilation will help in the cardiac failure balance too. We can also perform a lung ultrasound in order to find out the presence or absence of cardiogenic pulmonary edema through the B+ profile (more than three B lines) + lung sliding, using the BLUE Protocol,³ which it will help us succeed in the weaning attempt.

In their study Tseng et al.¹ show an SBT success in AF patients of 92.5% on the PSV arm vs a 73.1% on the T-piece arm. However no differences were shown in the weaning outcome. If once we go through the SBT successfully using PSV and we withdraw the tidal ventilation, we will lose the positive pressure ventilation effect on the patients hemodynamic and so on cardiac failure leading to a weaning failure; not because of respiratory failure but cardiac. Maybe this is the reason why there are no differences in the final outcome when comparing T-piece and PSV. After achieving our goals with the SBT, withdrawing the endotracheal tube, and if we continue the tidal ventilation, not through invasive ventilation but non-invasive ventilation, (mostly during short period of hours) we would not lose the hemodynamic effect, we will keep the cardiac failure under control and by doing so we will significantly improve our outcomes in weaning. Where there is cardiogenic pulmonary edema maintaining the tidal ventilation using NIV (CPAP evidence level A)⁴ will also help our success in the whole process. More data from larger, multicenter, randomized trials are needed to support this conclusion.

Conflict of interest

The authors have no conflict of interest to declare.

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Reply to the Letter: Different spontaneous breathing trials in patients with atrial fibrillation



Dear Editor,

We are grateful to Dr. Blanco and Dr. Esquinas for their comments regarding our article published recently in the Portuguese Journal of Pulmonology.¹ We do agree that increased cardiac workload may occur in patients with atrial fibrillation (AF) during weaning process with T-piece which may result in impending heart failure (HF) and/or HF and subsequent weaning failure from mechanical ventilation. Nevertheless, it is difficult to estimate the role of T-piece used as a spontaneous breathing trial (SBT) in weaning the patients with AF.

AF is the most common arrhythmia in particular in critically ill patients. The coexistence of AF and HF is well known, but the causative relationship between both conditions has not yet been well elucidated.² AF is able to facilitate HF in several ways. For example, the increasing heart rate causing a shorter diastolic filling time, the irregular heart beat, and impaired atrial systolic function may reduce cardiac output. Accordingly, when weaning the patients with AF, the potential risk of AF in impairing cardiac function of the patients with AF during weaning and after extubation of endotracheal tube should always be kept in mind, although it is difficult to evaluate the attribution of AF alone in causing HF and/or subsequent weaning failure.

In the clinical setting of weaning AF patients, the loss of positive pressure support during SBT using T-piece might impair cardiac function and result in subsequent weaning failure. However, our study enrolled AF patients who received two different SBT, including PSV and T-piece for only 30 min, before weaning from mechanical ventilation. It is not able to know how much loss of heart function during a short period of SBT with T-piece. Continuing positive pressure ventilation with non-invasive ventilation may be beneficial for weaning patients with HF. Up to the present time, the role of non-invasive ventilation after weaning AF patients from mechanical ventilation remains undetermined.³ The patient who needed non-invasive

ventilator after extubation of endotracheal tube was defined as failure to be weaned in this study.

Previous studies indicated that positive pressure ventilation reduced preload and afterload for patients with HF.⁴ These could all improve cardiac function. The intrathoracic pressure became negative, which induced increased venous return and impaired left ventricular ejection pressure gradient, when weaning HF patients with T-piece.⁴ Therefore, when start SBT, PSV may be beneficial for patients with HF. However, it is not clinically practical to use PSV for patients with AF and T-piece for patients without AF. This was why we performed the study. In addition, the continuous use of non-invasive ventilator including CPAP and BiPAP after extubation of endotracheal tube in patients with AF or impaired cardiac function is beyond the scope of this retrospective study.

As for weaning from mechanical ventilation for the patients with a variety of underlying morbidities, there are still a lot of questions waiting for resolution. Further prospective, randomized control studies with large population and/or multicenter studies are needed to find the best or optimal way or strategies to wean the AF patients from mechanical ventilation.

Conflict of interest statement

The authors have no conflicts of interest.

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