Letter to Editor

Right Heart is a Key to Response to Adaptive Servo-Ventilation Therapy

To the Editor,

The number of patients with advanced heart failure (HF) is increasing, and the ultimate surgical procedure, i.e., cardiac replacement therapy including heart transplantation and ventricular assist device implantation, has been expanding their uses. However, because of various associated issues such as their invasiveness and comorbidities, medical cost, and strict indication, alternative therapies are warranted particularly for less sick patients or those who are contraindicated for such a surgical approach.

Adaptive servo-ventilation (ASV) is one of the non-invasive positive pressure ventilation therapies for patients with congestive HF. ASV therapy improves the patients' hemodynamics and clinical outcomes irrespective of the existence of sleep-disordered breathing (SDB).¹⁾ However, a recently-published prospective randomized control trial of ASV therapy in HF patients with SDB demonstrated rather worse clinical outcomes compared with the control group,²⁾ and questioned the indication of ASV therapy in HF populations. Considering these results, our current concern is optimal patient selection for ASV therapy.

Several studies recently focused on various right heart-associated parameters as predictors of the response to ASV, instead of left heart-associated parameters. As a volume index, Iwasaku, *et al* stated that an enlarged right ventricle (RV) was associated with a smooth introduction of ASV therapy probably due to improved cardiac output (CO) by the therapy.³⁾ As a functional index, reduced tricuspid annular plane systolic excursion was associated with an increase in systolic volume during ASV support.⁴⁾ The authors hypothesized that improvement in RV function due to the unloading of preload on the RV also improved left ventricular diastolic performance via a right-left heart morphological interaction. As a pressure index, our team reported that an elevated baseline RV end-diastolic pressure was a key to increase CO during ASV support.⁵⁾ We explained this phenomenon by a right-left heart transmural pressure interaction. In summary, a great decrease in RV end-diastolic pressure during ASV support results in an increase in transmural LVEDP and successive improvement in CO, depending on the Frank-Starling law.

These studies focus on the right heart condition from

different aspects, and similarly conclude baseline right heart dysfunction would be a key to the response to ASV. ASV reduces the preload of the RV and paradoxically increases the output of the LV. A sufficient "target space" for ASV to treat, i.e., "congestion", which is assessed by the various right heart-associated indices described above, may be required for the increase of LV output. On the contrary, ASV therapy with inappropriately high positive pressure in patients without any RV dysfunction would rather reduce CO and may worsen clinical outcomes, as observed in a previous large trial.²⁾ Better modalities to assess congestion, which is non-invasive and easy-to-measure without any expert technique, are warranted for optimal patient selection.

Disclosures

Conflicts of interest: T.I. has a potential conflict of interest with Tejin Pharma Co. including consulting fees.

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