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From the authors:

We greatly appreciate the comments made by S. Teramoto and co-workers. In our study [1] we suggested that spectral analysis of heart rate in patients with mild-to-moderate heart failure could be of value in ruling out severe sleep-disordered breathing (SDB), and its use could reduce the burden on sleep laboratories screening for SDB in the heart failure population. However, we stressed that further prospective validation was required and discussed in depth the limitations of spectral analysis of heart rate variability (HRV) as a rule-out test for SDB in heart failure. The key limitation is that it cannot be applied to heart failure patients with atrial fibrillation (AF), or those with extensive pacing or excessive ventricular ectopy. Therefore, these groups of patients were excluded for analysis of HRV in our study. Thus, we agree with S. Teramoto and co-workers that a more precise conclusion would be: ''spectral analysis of heart rate variation is useful as a rule-out test for SDB in patients with heart failure without significant arrhythmia''.

The major advantage of HRV analysis is that it can be used within the cardiology setting, where cardiologists are using a tool that they are much more familiar with than pulse oximetry. Furthermore, heart failure patients who have already undergone Holter monitoring to assess for potential arrhythmias could also have their Holter monitoring analysed for SDB. As we discussed in our paper, the combination of pulse oximetry together with HRV may be a stronger, more comprehensive screening tool for SDB as patients who are paced or who have arrhythmias can be screened for SDB.

We indicated that the presence of SDB is likely to be high in heart failure patients with AF [2], and as HRV analysis cannot be applied to these patients we have suggested that these individuals should be assessed for SDB using pulse oximetry.

S. Teramoto and colleagues raise the issue of the possible effects of medication on the percentage very low frequency index (%VLFI) component of spectral analysis of HRV. There are published data on the effects of medication on other aspects of HRV; however, data on the effects of medication on %VLFI are lacking. In our population of heart failure patients, all patients who underwent HRV analysis were taking angiotensin-converting enzymes or angiotenesin II receptor blocker, and 72% were also taking β-blocker, 12% digoxin and 32% diuretics. Thus, the results from our study also include the possible effects of medications on %VLFI. Furthermore, ROCHE and co-workers [3, 4] published data on %VLFI within patients screened for obstructive sleep apnoea, and a significant number of these patients were on various cardiac medications.

S. Teramoto and co-workers also raise the point that heart failure patients with neurological comorbidity may have abnormalities in the autonomic and central nervous system, which could affect heart rate variability. They suggest that such patients should not undergo heart rate variability analysis. In our study, heart failure patients did not have neurological deficits, so findings cannot be extrapolated to heart failure patients with concurrent neurological deficit. The effect of the presence of abnormal neurology on percentage very low frequency index is unclear and further investigation is required.

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