The Vicious Combination of Left Ventricular Diastolic Dysfunction and Frailty

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The heart failure (HF) pandemic is an impeding problem in aging societies such as Japan. Thus, prevention of HF progression from stage A to stage C is the mandate issue to be solved. Left ventricular diastolic dysfunction is one of the major pathogeneses of HF with preserved ejection fraction (HFpEF) in the elderly population. In this issue of the Journal, Kusunose et al demonstrated a significant association between frailty and diastolic dysfunction, and both showed incremental prognostic significance in an elderly population with stage A/B HF.

It is not hard to imagine that severe diastolic dysfunction causes shortness of breath on excursion, and patients tend to avoid exercise and prefer an inactive life style. Such a sedentary daily activity habit may result in frailty with aging. On the other hand, it is unclear whether frailty itself affects the diastolic function of the left ventricle. Kusunose et al investigated the echocardiographic parameters and frailty in patients with LVEF >45%, non-atrial fibrillation, and non-significant valvular disease, and reported that the group of frail patients showed worse diastolic function compared with the other group without frailty. The results suggested a close relationship between frailty and diastolic function.

HFpEF patients have abnormalities in skeletal muscle...
mass, composition, and oxidative metabolism. Why should certain HFpEF patients have accompanying muscle weakness? One possible answer is that HFpEF is a systemic disorder involving not only the cardiac muscles, but also skeletal muscle and that skeletal muscle and cardiac abnormalities are incited by common, circulating factors such as proinflammatory cytokines. Recently, systemic inflammation induced by sarcopenia, accompanied by frailty has been focused on as a pathogenesis of HFpEF evolution. Exercise training has been shown in multiple studies to significantly improve peak VO₂ in HFpEF. Therefore, rehabilitation for skeletal muscle strength may improve frailty and diastolic function but has not been examined systematically.

Another important message from the Kusunose et al presentation is that echocardiographic assessment of new diastolic dysfunction grade can predict HF prognosis significantly. “Diastology” was started in 1982 by Kitabatake et al reporting transmitral flow velocity profile as a marker of diastolic function. The tissue Doppler velocity profile, focused on by Oki et al, or Nagueh et al, contributed to improving accuracy in assessing diastolic function by echocardiography. Recently, speckle tracking echocardiography-derived global longitudinal strain, as a new diagnostic echocardiographic modality to assess cardiac chamber deformation, may provide further improvement in assessing cardiac diastolic function and prognosis (Figure). Newly updated utilization of echocardiography must benefit the quality of daily clinical HF practice.

References