Clinical significance of brachial-ankle pulse wave velocity in patients with heart failure with reduced left ventricular ejection fraction

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Topic(s):
Systolic Ventricular Dysfunction

Citation:
Background: Heart failure (HF) is characterized as a complex syndrome of structural and functional cardiac disorder that impair ventricular filling and/or blood ejection. Peripheral arterial disease (PAD) is accompanied by systemic inflammation and is frequently associated with other cardiovascular diseases. Although PAD and HF share cardiovascular risk and pathophysiological features, and each has been associated with increased morbidity and mortality. Pulse wave velocity (PWV) is known to be an indicator of arterial stiffness. We previously reported the prognostic significance of brachial–ankle PWV (baPWV) in patients with HF with preserved left ventricular ejection fraction. However, its association with cardiovascular outcomes in HF with reduced EF (HFrEF) and HF with mid-range EF (HFmrEF) patients remains uncertain.

Purpose: The first aim of this study was to investigate the impact of PAD on prognosis in HFrEF and HFmrEF. The second aim was to investigate the relationship between baPWV and the occurrence of cardiovascular events in patients with HFrEF and HFmrEF.

Methods: We measured ankle-brachial pressure index (ABI) and baPWV values at stable condition after optimal therapy for HF in 201 consecutive HFrEF and HFmrEF patients admitted to Kumamoto University Hospital from 2007 to 2015 who were enrolled and followed until the occurrence of cardiovascular events.

Results: The mean age of the two groups of patients was 67.5 ± 11.8 years. The prevalence of PAD, defined as an ABI 0.9 or less, was 14% in patients. Kaplan–Meier analysis revealed that HFrEF and HFmrEF patients with PAD had a significant higher risk of total cardiovascular and HF-related events than those without PAD (P=0.03 and P=0.01, respectively). The hazard ratio (HR) between HFrEF and HFmrEF patients without PAD and those with PAD was compared after adjustment for other confounders. The probabilities of total cardiovascular and HF-related events in HFrEF and HFmrEF patients with PAD were significantly higher than those in HFrEF and HFmrEF patients without PAD (HR: 2.19; 95% CI: 1.02–4.73; P=0.04, and HR:3.5; 95% CI: 1.27–9.66; P=0.01, respectively). Next, we divided HFrEF and HFmrEF patients without PAD into three groups according to baPWV values. In the Kaplan–Meier analysis, total cardiovascular and HF-related events in the highest baPWV group (1800 cm/s\(\leq \)baPWV) had a significantly higher frequency than those in the mid-level baPWV group (1400 cm/s<baPWV<1800 cm/s) (P=0.007 and P=0.004, respectively) (FigureA/B). The hazard ratio (HR) between HFrEF and HFmrEF patients in the mid-level baPWV group and those with other baPWV groups was compared after adjustment for other confounders. The probabilities of total cardiovascular and HF-related events were significantly higher in the highest baPWV group.

Conclusion: Identifying complications of PAD and measuring baPWV values in HFrEF and HFmrEF patients were useful for predicting their prognosis.
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Topic(s): Systolic Ventricular Dysfunction

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Conclusion: Identifying complications of PAD and measuring baPWV values in HFrEF and HFmrEF patients were useful for predicting their prognosis.

Kaplan-Meier analysis of total cardiovascular events (A), HF-related events (B) in HFrEF patients according to three baPWV groups.

*P<0.01 compared with 1400 cm/s<baPWV<1800 cm/s.