Evaluation of the cyclelength-dependence of left ventricular systolic and diastolic function in patients with atrial fibrillation using tissue Doppler echocardiography: Comparison between normal and depressed ejection fraction

K. I. Kim * · Y. J. Kim * · D. W. Sohn* · I. H. Chai*
M. M. Lee* · B. H. Oh* · Y. B. Park* · Y. S. Choi*

1. Background

Tissue Doppler derived mitral annulus velocity was reported to be a useful marker for left ventricular (LV) systolic and diastolic function in atrial fibrillation (AF). We investigated the cyclelength-dependence of LV systolic and diastolic function in AF patients with variable LV function using tissue Doppler echocardiography.

2. Methods

Peak systolic (S') and diastolic (E') mitral annulus velocities were measured for 10 consecutive beats in 26 patients (mean age: 63 ± 10 years) with nonvalvular AF. LV ejection fraction was normal in 18 patients (Gr I) and depressed in 8 patients (Gr II). In each patient, S' (S'%) and E' (E'%) were normalized as a percentage of the maximum observed value and plotted against the ratio of preceding to pre-preceding RR intervals (RR1/RR2)..
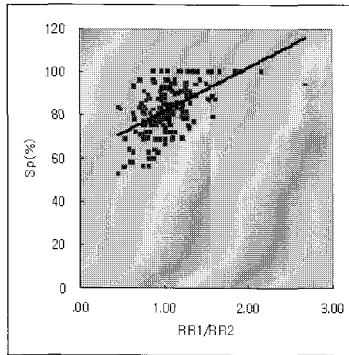
3. Results

In total of 26 patients, mean S' was 4.97 ± 1.21 cm/s and E' was 7.52 ± 2.11 cm/s. S'% correlated well with RR1/RR2 in both groups but showed better correlation in Gr II ($r = 0.571$, p <0.001 in Gr I, $r = 0.790$, p<0.001 in GrII). In contrast, there was no significant relationship between E'% and RR1/RR2. When RR1/RR2< 1, S' was significantly lower in Gr II (4.7 ± 0.9 vs 3.8 ± 0.9 cm/s, p<0.001). However, there was no difference between the groups with RR1/RR2 > 1 (5.4 ± 1.0 vs 5.3 ± 1.5 cm/s, p>0.05).

4. Conclusion

In AF patients, LV systolic function was dependent on RR1/RR2 and its dependence was more prominent in patients with depressed LV ejection fraction. In contrast, diastolic function did not show the cyclelength-dependence.

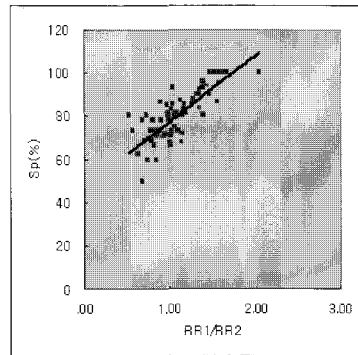---

* Seoul National University College of Medicine

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EF ≥ 50% (Gr I)　　　　**EF < 50% (Gr Ⅱ)**

$y = 20.31x + 61.19$

$R^2 = 0.3263$

$y = 30.07x + 47.29$

$R^2 = 0.6246$