Effect of Right Atrial Pacing on Left Ventricular Runction

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Aim: To study the effect of incremental heart rates (HR) on LV longitudinal strain and other parameters of LV function.

- **Background:** A decrease in left ventricular (LV) longitudinal contraction during stress echocardiograms has been proposed to detect ischemia. However, LV strain may be affected similarly by physiological changes induced by stress such as increased HR.

- **Methods:** We studied patients who had dual chamber pacemakers (mostly for sick sinus syndrome) with intact A-V conduction but without known coronary disease.

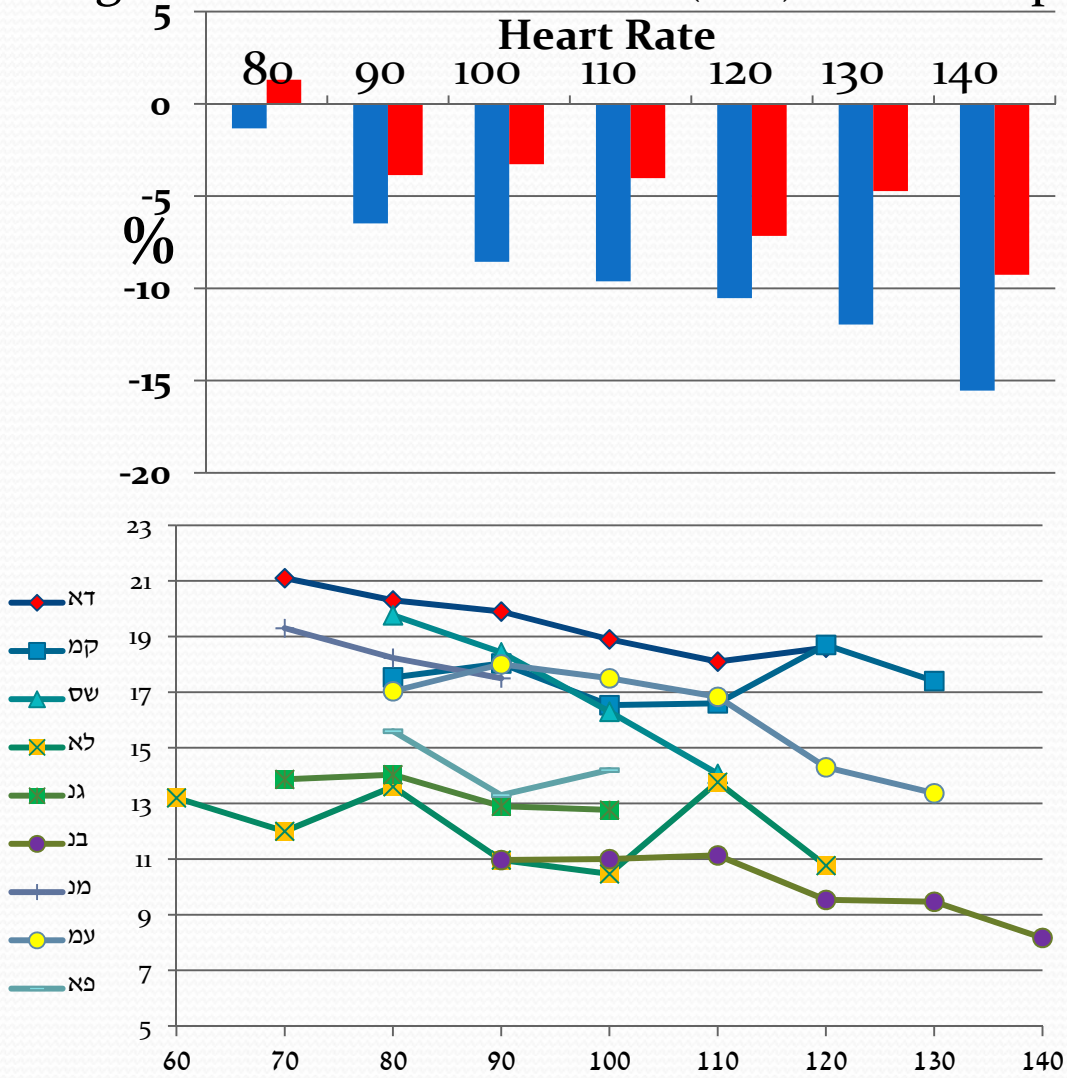
  Patients were paced from the right atrium in 10 bpm increments until target HR was attained or until occurrence of A-V block or atrial fibrillation.

  An echo study was performed and blood pressure (BP) measured at each stage. Global longitudinal strain was determined semi-automatically by the speckle tracking method.

- Results: Of 13 patients studied, 11 had adequate echo quality throughout the study (age 73.0±3.6 years, 8 women).
- **Mean HR** increased from 70.8±10.4 to 123.8±12.6 bpm, (mean increase: 52.3±12.4 bpm).
- **Mean BP** did not change (mean 132/70 to 124/77 mmHg, p=NS).
- **LV inflow and outflow stroke volumes** (represented by mitral and aortic velocity-time-integrals) decreased. Inflow: 27.2±7.1 to 16.0±4.9 cm; outflow: 22.0±5.2 to 10.2±2.8 cm, p<0.0001 for both).
- **Cardiac output** did not decrease.
- **LV longitudinal strain:** worsened in all patients (from mean -16.5±3.7% to -14.1±3.3%, p<0.0001).

- In figure: % change of longitudinal strain from baseline (blue) and from previous stage (red).

Percent change of strain from baseline (blue) and from previous stage (red)



Changes in longitudinal strain of individual patients

Conclusions

- There was an inverse relation between the increase in HR and myocardial global longitudinal contraction.
- This was not a result of changes in BP or CO which were unchanged by right atrial pacing.
- A decrease in longitudinal contraction during stress echo studies may result from the increase in HR per se; it does not necessarily indicate ischemia.
- Normal ranges for changes in longitudinal strain secondary to increased HR must be defined in order to facilitate separation between the normal effects of increased HR during stress echo studies and myocardial ischemia.

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