Atrial Pacing May Negate the Benefits of Resynchronization

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Background: Cardiac resynchronization therapy (CRT) was proven beneficial in the VDD mode; however, since FDA approval most patients are programmed DDD/DDDR where single site right atrial pacing (SSRAP) dominates. The impact of SSRAP on the delivery of CRT is not known and may have untoward effects similar to those of single site RV pacing reported in the DAVID trial. The purpose of this study was to evaluate the effect of SSRAP on atrial depolarization in patients receiving a CRT device.

Methods: At the time of implant 34 patients had bipolar electrograms recorded simultaneously from the RA pacing lead and a mid CS catheter during sinus rhythm and SSRAP.

The RA-LA activation time was measured from the onset of RA activation or pacer spike to the end of LA activation in the mid CS.

Results: The mean sinus RA-LA activation time was 147.7ms compared to 204.1ms with SSRAP. The paced RA-LA activation time varied unpredictably from -20 to 192ms.

Conclusion: SSRAP has a profound and unpredictable impact on the duration of atrial depolarization, which has important implications for programming CRT devices. Although paced RA-LA activation time is much longer than sinus, the sinus activation time does not reliably predict the paced activation time. If nominal paced AV delay settings are used the majority of pts will have LA contraction occur during LV contraction, producing pacemaker syndrome. It may not be possible to program the paced AV delay to allow both complete LA depolarization and LV pacing in cases where the RA-LA activation time exceeds 190 ms. In these cases alternative approaches to atrial pacing for CRT are needed.

The DTS is a valid tool for use in asymptomatic women.
Physical Inactivity and Increased Thrombotic Risk: The Framingham Heart Study

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Background: The link between physical inactivity and cardiovascular disease (CVD) is increasingly recognised, yet society is becoming more sedentary. To investigate the mechanism by which inactivity increases CVD, we studied the relationship between physical activity and hemostatic risk markers in the Framingham Offspring Cohort.

Methods: We studied 3133 subjects (mean age 54 years, 55% female) who participated in cycle 5. Fibrinogen was measured using the Clauss method, while tissue plasminogen activator (TPA) antigen, plasminogen activator inhibitor (PAI-1), von Willebrand factor (VWF) and factor VII antigen were ELISA. Plasma viscosity was measured using the Brookfield Viscometer. Physical activity level was divided into quartiles. Mean values adjusted for age are displayed for quartiles 1 (least active) and 4 (most active). P-values for Q4 vs Q1 were obtained adjusted first for age (1) and then additionally for body mass index, systolic blood pressure, diabetes, smoking, total cholesterol and HDL (2).

Results: The inactive group (Quartile 1) had higher levels of prothrombotic factors (fibrinogen, PAI-1, TPA antigen and factor VII) with the exception of plasma viscosity in men. These differences persisted on adjustment for factors including body mass index.

Conclusion: A prothrombotic state may be a mechanism by which a sedentary lifestyle elevates CVD risk. Regular physical activity provides a ready way to lower CVD risk, in part through a reduced thrombotic potential.

Physical Activity and Thrombotic State

<table>
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Submaximal Effort Tolerance After Cardiac Rehabilitation Is a Strong and Age-Independent Predictor of All-Cause Mortality

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Background: Peak effort capacity during maximal exercise testing and distance achieved during timed walking are strong predictors of survival in patients with heart disease, but the risk stratification role of submaximal treadmill tolerance during routine exercise training is less clear.

Methods: We examined the relationship of submaximal treadmill effort capacity (guided by heart rate and perceived exertion) to all-cause mortality in 380 patients with varied manifestations of predominantly ischemic heart disease referred to a 12 week program of exercise training and cardiac rehabilitation. There were 273 men and 107 women, whose mean age was 65 ± 12 years; there were 66 patients with diabetes and 100 patients who were obese, including 28 patients who were both diabetic and obese.

Results: Mean submaximal effort tolerance calculated from treadmill performance during training was 3.8 ± 1.4 METs at program entry and 6.9 ± 2.2 METs at exit. There were 18 deaths during a mean follow-up period of 3.1 ± 1.5 years. By univariate Cox proportional hazard model, individual predictors of survival were submaximal effort level at entry (chi square 8.7, p=0.005) and at exit (chi square 13.6, p=0.001), the change in submaximal MET capacity during training (chi square 12.3, p=0.001), and age (chi square 6.5, p=0.02). There was no significant univariate predictor effect for sex, diabetes, or obesity.

By multiple stepwise conditional Cox regression incorporating all variables, only exit submaximal effort tolerance was a significant predictor of all-cause mortality. In this model, each 1 MET decrease in exit submaximal effort tolerance was associated with a 42% increase in mortality (hazard ratio 0.58 (95% confidence interval 0.44-0.78, chi square 13.6, p<0.001)). Exit submaximal MET level was inversely correlated with age (r = -0.505, p=0.001). After adjustment for age, the hazard ratio of exit submaximal MET level for mortality was 0.61 (95% confidence interval 0.45-0.83, p=0.005).

Conclusion: Submaximal effort tolerance at completion of cardiac rehabilitation is a strong and age-independent predictor of mortality.