

High-Intensity Interval Exercise May Improve Cardiac and Arterial Function in Systolic Heart Failure Patients

Written by Toni Rizzo

The objective of this phase 3 clinical trial, presented by Christina Chrysohoou, MD, PhD, University of Athens, Athens, Greece, was to evaluate the effect of a high-intensity interval exercise program on left ventricular (LV) function and systemic arterial stiffness in patients with congestive heart failure (CHF) [Chrysohoou C et al. *Int J Cardiol.* 2015].

The inclusion criteria included NYHA class II to IV and ejection fraction < 30%. Patients were randomized 1:1 to the exercise arm (n=50) or the control arm (n=50). Patients in the exercise arm underwent an exercise session 3 days per week for a total of 12 weeks. Each session consisted of high-intensity interval ergometric aerobic cycles of 30 seconds at 100% of maximum workload followed by 30 seconds of rest for a duration of 30 minutes. The control group received routine CHF care.

Patients were assessed with a cardiopulmonary stress test, noninvasive high-fidelity tonometry of the radial artery, pulse-wave velocity measurement, and echocardiography before and after completion of the training program. Maximal oxygen uptake and maximum carbon dioxide production were measured breath by breath, before and after the exercise training. The primary end points of the trial were quality of life (QoL), LV diastolic function, and aortic elastic properties at 12 weeks.

Among the 50 patients originally randomized to each arm, 33 in the exercise arm and 39 in the control arm completed the trial. The patients in the exercise training arm were aged 63 ± 9 years and 88% were men. The patients in the control arm were aged 56 ± 11 years and 82% were men. Seventy percent of the patients in both arms had ischemic heart failure. No statistical differences in baseline physical activity status (evaluated by the International Physical Activity Questionnaire), body mass index, smoking habits, history of hypertension, diabetes, or dyslipidemia were found. Data were evaluated using an intention-to-treat analysis.

In the exercise arm, a general mixed-effects model demonstrated reductions from baseline to 12 weeks in a variety of measurements (Table 1).

Table 1. Changes in Key Measurements of Diastolic Function, Aortic Stiffness, and Quality of Life Among Patients Randomized to Exercise

	Change at 12 wk, %	P Value
Pulse wave velocity	-9	.05
Emv/Vp	-14	.06
E:A	-24	.004
E:EMV	-8	.05
Augmentation index	+29	.01
VTI	+4	.05
6-min walk distance	Up to +13	.05
Peak oxygen uptake	+28	.001
Peak power	+25	.005
MLHFQ	+66	.003
Depression score	+19	.05

MLHFQ, Minnesota Living With Heart Failure Questionnaire

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No significant changes from baseline were observed in any of the parameters in the control group. The investigators concluded that high-intensity interval aerobic training, combined with strength exercise, may benefit aortic dilatation capacity, augment systolic pressure, and improve LV diastolic function and QoL.

Researchers Recommend Septal vs Apical Pacing Following the Results of a Randomized Study

Written by Dennis Bittner

Right ventricular apical (RVA) pacing can lead to mechanical dyssynchrony in the left ventricle, increasing atrial fibrillation and the incidence of heart failure. Right ventricular septal (RVS) pacing may attenuate the mechanical dyssynchrony and has been proposed as an alternative, but data from rigorous studies are limited. S. Azzaz, S. Kacem, S. Ouali, and colleagues, Sahloul Teaching Hospital, Sousse, Tunisia, conducted a randomized study to determine whether RVS pacing is superior to RVA pacing in pacemaker (PM) implantation by comparing left ventricular (LV) function and dyssynchrony parameters resulting from interventricular septal vs RVA pacing.

Patients with high-degree atrioventricular block who were candidates for dual-chamber PM implantation were randomized to either apical (group A) or septal (group B) right ventricular lead placement. Levels of LV function and dyssynchrony were determined by echocardiography at the time of PM implantation and 6 months later. Patients with coronary artery disease, prominent valvular heart disease, and/or cardiomyopathies were excluded from the study. Lead implantation was performed under fluoroscopy control. A total of 57 patients were randomized to group A (n=29) and group B (n=28). In the overall population, the mean age was 69 years, about 50% were male, 60% had hypertension, and 20% had diabetes; 95% experienced cumulative ventricular pacing. Follow-up data at 6 months were available for 48 patients. All analyses are exploratory.

Postprocedure and at 6 months, septal pacing was associated with a significantly lower Tei index (a global parameter of cardiac function combining systole and diastole information) than apical pacing. In addition, the E/A ratio was significantly higher in septal compared with apical pacing, and global longitudinal strain (GLS) was improved with septal compared apical pacing. Multiple parameters were nominally different between the groups after the procedure and at 6 months; radial and longitudinal dyssynchrony and septal-to-lateral wall

delay were nominally higher in the apical group compared with the septal group.

Although statistically significant differences in dyssynchrony were not present, the investigators said that the septal pacing seemed to be associated with better global LV function and that they recommend septal as an alternative to apical stimulation. The investigators also said that GLS continued to be better in the septal group (-15.8 vs -14.4; $P=.003$) 6 months after PM implantation. The Tei index continued to be seen as lower in the septal group compared with the apical group (0.43 vs 0.57, respectively; $P=.002$).

RT3D TEE Superior to 2D TEE in the Diagnosis and Treatment of Mitral Periprosthetic Leaks

Written by Maria Vinall

A major advantage of real-time 3D transesophageal echocardiography (RT3D TEE) is its ability to provide realistic and comprehensive views of cardiac valves and congenital abnormalities [Lang RM et al. *J Am Col Cardiol.* 2006]. It also allows immediate feedback on the effectiveness of surgical interventions. Bruno Bochar-Villanueva, MD, Department of Cardiology, University General Hospital of Valencia, Valencia, Spain, discussed the results of a single-center study in which RT3D TEE was superior to 2D TEE in the assessment of mitral periprosthetic leaks and in guiding percutaneous closure of these leaks.

The diagnosis and treatment of periprosthetic mitral valve is challenging. This case series comprised 26 patients (mean age, 69.6 years; 65% women) diagnosed with significant mitral periprosthetic leak by transthoracic echocardiography between March 2011 and February 2014. Both 2D and RT3D TEE were performed on all patients and the results were analyzed for the number of leaks, leak location(s), the effective regurgitant orifice area (EROA) by proximal convergence method (2D), and direct planimetry using multiplanar reconstruction software (3D). The sphericity index was obtained by the ratio between the largest and smallest diameters of the leak.

The most common leak location was posterior (13 patients), followed by septal (6 patients), lateral (5 patients), and anterior (2 patients). EROA could not be calculated in 9 patients using 2D TEE but was calculable in all patients using RT3D TEE. In addition, when calculated using RT3D TEE, the EROA was significantly ($P<.01$) greater ($0.31 \pm 0.19 \text{ cm}^2$) than that when calculated using 2D TEE ($0.24 \pm 0.13 \text{ cm}^2$). The sphericity