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 Bochard-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 ± 0.19 cm^2) than that when calculated using 2D TEE (0.24 ± 0.13 cm^2). The sphericity

Table 1. Patient Description: 2D vs RT3D TEE

			Severity			No.		EROA[a], cm^2		Diameter[b], mm			
No.	Sex	Age, y	2D	3D	Location	2D	3D	2D	3D	D	d	EI	Treatment
1	F	71	III	IV	Septal	1	2	0.20	0.30	89	47	1.89	Percutaneous closure
2	F	71	III	IV	Lateral	1	2	0.17	0.43	134	54	2.48	Medical
3	M	36	IV	III	Septal	1	1	0.29	0.13	53	31	1.71	Medical
4	F	67	III	III	Lateral	1	2		0.20	65	35	1.86	Medical
5	F	81	III	III	Posterior	1	1	0.11	0.30	87	47	1.85	Percutaneous closure
6	F	67	II	II	Lateral	1	1	0.05	0.11	59	25	2.36	Medical
7	F	77	II	II	Posterior	1	1	0.10	0.15	67	29	2.31	Percutaneous closure
8	F	73	II	II	Posterior	1	1	0.12	0.13	61	28	2.18	Medical
9	F	45	III	III	Posterior	1	1	0.13	0.20	89	26	3.42	Surgical repair
10	M	72	II	II	Septal	1	1		0.10	48	32	1.50	Medical
11	F	61	II	II	Posterior	1	1		0.14	56	31	1.81	Mitral valve replacement
12	F	75	I	I	Posterior	1	1	0.10	0.07	38	20	1.90	Medical
13	F	65	I	I	Posterior	2	2		0.12	77	25	3.08	Medical
14	F	68	I	I	Anterior	1	1		0.04	23	22	1.04	Medical
15	M	81	IV	IV	Septal	1	3	0.29	0.46	115	35	3.29	Percutaneous closure
16	F	85	III	III	Septal	2	2		0.26	88	20	4.40	Medical
17	M	72	III	II	Septal	1	1	0.14	0.11	46	26	1.77	Medical
18	M	73	IV	IV	Lateral	1	1	0.21	0.26	80	40	2.00	Percutaneous closure
19	F	63	I	I	Posterior	2	2		0.01	12	10	1.20	Medical
20	F	76	II	II	Posterior	1	1	0.15	0.16	66	30	2.20	Surgical repair
21	F	63	IV	IV	Lateral	1	1	0.31	0.44	131	46	2.85	Percutaneous closure
22	M	51	I	I	Posterior	1	1		0.09	57	21	2.71	Mitral valve replacement
23	F	58	IV	IV	Posterior	1	1	0.49	0.68	224	22	10.18	Percutaneous closure
24	M	79	I	II	Posterior	1	1		0.09	47	28	1.68	Medical
25	M	64	IV	IV	Anterior	1	1	0.33	0.24	84	45	1.87	Percutaneous closure
26	M	79	II	III	Posterior	3	3	0.12	0.35	122	36	3.39	Medical

EI, endotracheal intubation; EROA, effective regurgitant orifice area; RT3D TEE, real-time 3D transesophageal echocardiography.

[a]Blank cells indicate that the value was unable to be calculated.

[b]Capital and lowercase D/d indicate largest and smallest diameters.

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index was < 1.5 in only 2 patients. The use of RT3D TEE permitted percutaneous closure of the leak in 8 patients, and the major diameter was used to choose the device size. Table 1 compares the patients in this study based on the results of 2D and RT3D TEE.

In this study, RT3D TEE allowed for an accurate diagnosis of the EROA dimension, proper choice of closure device, and guided percutaneous leak closure.

Long-term Antihypertensive Treatment Decreases LV Twisting and Untwisting in Patients With Hypertension

Written by Nicola Parry

Ignatios Ikonomidis, MD, PhD, University of Athens Medical School, Attikon Hospital, Athens, Greece, presented results of a 3-year follow-up study, which demonstrated that long-term antihypertensive treatment improved the twist and untwist mechanics of the left ventricle in patients with hypertension, in addition to reducing blood pressure (BP), left ventricular (LV) mass, and arterial stiffness.

According to Prof Ikonomidis, LV function in patients with hypertension is determined by factors such as BP, arterial stiffness, LV mass, and coronary microcirculation. With this in mind, the researchers conducted a study to investigate the long-term effects of antihypertensive treatment on these parameters in this patient population.

The study enrolled 75 untreated patients (mean age, 54 ± 11 years) with essential hypertension and 50 healthy control participants of a similar age and sex distribution. All patients with hypertension were treated with angiotensin receptor blockers, and characterized as having well-controlled BP if their 24-hour systolic and diastolic BP were < 130/80 mm Hg.

At baseline and after 3-year follow-up, 24-hour ambulatory BP monitoring was performed in all study participants. Additional parameters were also assessed using conventional and speckle tracking echocardiography, including: carotid to femoral artery pulse wave velocity (PWV); coronary flow reserve (CFR) after adenosine infusion; LV mass/in^2, twisting (Tw); peak Tw velocity; untwisting at the mitral valve opening (unTwMVO), at the peak of the E wave (unTwE), and at the end of the E wave (unTwendE) of the mitral inflow; and untwisting (unTw) velocity.

Prof Ikonomidis explained that since LV torsional dynamics are sensitive markers of LV function, short-axis 2D images were analyzed for LV torsion, which was defined as the difference in rotation between the basal and apical planes.

Compared with control participants, those with hypertension had lower CFR (2.5 ± 0.6 vs 2.9 ± 0.6) and higher PWV (9.2 ± 1.5 vs 11.7 ± 2 m/s), Tw (13 ± 4 vs 20 ± 4 degrees), Tw velocity (89 ± 21 vs 126 ± 38 deg/s), unTwMVO (8.8 ± 3.2 vs 15.7 ± 5 degrees), unTwE (5.8 ± 3.1 vs 10 ± 5 degrees), unTwendE (2.2 ± 2.1 vs 5.8 ± 4 degrees), unTw velocity (–93 ± 31 vs –104 ± 37 deg/s), LV mass/m^2 (70.7 ± 14 vs 81 ± 16), and BP (P < .01 for all comparisons).

After 3 years of antihypertensive treatment, BP was well controlled in 70% of the patients with hypertension. Compared with baseline, these patients had reduced PWV (11.7 ± 2 vs 10.8 ± 1.5 m/s), Tw (20 ± 4 vs 15 ± 4 degrees), Tw velocity (126 ± 38 vs 110 ± 21 deg/s), unTwMVO (15.7 ± 4 vs 10.5 ± 4 degrees), unTwE (10.5 ± 4 vs 7.2 ± 4 degrees), unTwendE (5.8 ± 4 vs 3.9 ± 4 degrees), unTw velocity (–104 ± 37 vs –94 ± 31 deg/s), LV mass/m^2 (81 ± 16 vs 75 ± 16), and 24-hour BP (systolic 138 ± 10 vs 123 ± 14 mm Hg; and diastolic 87 ± 9 vs 75 ± 8 mm Hg; P < .05 for all comparisons). However, CFR remained similar (2.5 ± 0.6 vs 2.5 ± 0.9).

Prof Ikonomidis therefore concluded that long-term antihypertensive treatment improves LV twisting and untwisting in patients with essential hypertension, concomitant with reductions in BP, LV mass, and arterial stiffness.

Extent of Infarction Early Post-STEMI Does Not Correlate With Long-term Myocardial Recovery

Written by Nicola Parry

José Fernando Rodríguez Palomares, MD, University Hospital Vall d'Hebron, Barcelona, Spain, shared preliminary results from the PROMISE trial [NCT00781404] in patients with STEMI in which transmural infarction was identified by cardiac magnetic resonance imaging (CMR) early after STEMI. At the 6-month follow-up, the results demonstrated a decreased extent of infarction in many affected myocardial segments, with significant improvements in their contractile function.

According to Prof Rodríguez Palomares, in patients with acute myocardial infarction, the extent of transmural necrosis, as determined by CMR in the early post-STEMI phase, has been established as an excellent predictor of improvement in myocardial contractile function. However, data from some studies have suggested that the extent of transmural necrosis can be overestimated during the acute phase because of