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Boston  
Scientific

54.8%

of first time ICD recipients were  
candidates for S-ICD.<sup>1</sup>

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REFERENCE

1. Friedman DJ, et al. Trends and In-Hospital Outcomes Associated with Adoption of the Subcutaneous Implantable Cardioverter Defibrillator in the United States. JAMA Cardiology 2016.

## CASE REPORTS

# Use of Triple-Site Ventricular Pacing in a Patient with Severe Congestive Heart Failure and Atrial Fibrillation

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*Cardiac resynchronization therapy (CRT) has become an accepted treatment for selected patients with drug-resistant heart failure. Data for patients in atrial fibrillation (AF) remains limited but suggests benefit in these patients too. We report the case of an 82-year-old patient with heart failure, VVIR permanent pacemaker, and permanent AF who had an upgrade to triple-site CRT implantation with good clinical response. Triple-site ventricular pacing may enhance the chance of response and LV reverse remodeling and should be considered in AF patients undergoing CRT implantation. (PACE 2009; 32:673–674)*

### **Cardiac resynchronization therapy, triple-site ventricular pacing**

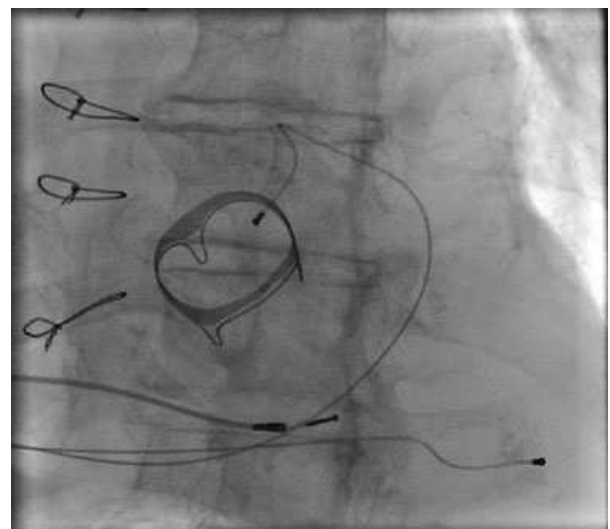
#### **Case Report**

An 82-year-old man with previous mitral valve replacement (bioprosthesis), permanent atrial fibrillation (AF), and single-chamber VVIR permanent pacemaker presented with increasing breathlessness. His pacemaker had been implanted in 2004 for bradycardia associated with AF. On questioning he had New York Heart Association class IV heart failure symptoms despite optimal medical therapy. On examination he was in cardiac failure, and resting 12-lead electrocardiogram showed a paced ventricular rhythm (QRS duration 180 ms) with underlying AF. His pacing check revealed he was requiring right ventricular pacing 91% of the time. Transthoracic echocardiography with his intrinsic rhythm (intrinsic QRS duration 150 ms) revealed severe left ventricular impairment (ejection fraction <30%) and mild mitral regurgitation. Coronary angiography revealed only mild-to-moderate coronary artery disease with no revascularization targets.

Given these findings he underwent cardiac resynchronization therapy (CRT) upgrade. During implantation coronary venography revealed poor distal target vessels; however, a small posterolateral branch and anterior branch were noted and an attempt was made to place two left ventricular (LV) pacing leads. A unipolar Medtronic 4193 (Minneapolis, MN, USA) LV lead was inserted into a posterolateral branch with excellent pacing/sensing data with a second Medtronic 4193 LV lead positioned in an anterior branch, again with

excellent data (Fig. 1). The two LV leads and right ventricular lead were connected to a Guidant Con-tak Renewal (Boston Scientific, Natick, MA, USA) pulse generator with the shortest programmable AV delay of 10 ms and placed into a prepectoral pocket. The patient's symptoms improved almost immediately and he remains well at follow-up.

CRT has become an accepted treatment for selected patients with drug-resistant heart failure.<sup>1</sup> Data for patients in AF remain limited but suggest benefit in these patients too. The recently published TRIP-HF (Triple Resynchronization in Paced Heart Failure Patients)<sup>2</sup> study compared triple-site stimulation—two epicardial transvenous leads placed on the anterior and lateral or posterolateral LV wall and one right ventricular



**Figure 1.** Left anterior oblique projection showing two unipolar left ventricular leads placed in the posterolateral and anterior coronary venous system.

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lead with conventional biventricular pacing. The study enrolled patients with severe heart failure presenting with a slow ventricular rate during AF and showed that compared with dual-site biventricular pacing, triple-site ventricular stimulation promoted further LV reverse remodeling

as assessed by LV end-systolic and end-diastolic volumes and ejection fraction, at 3-month follow-up. Triple-site ventricular pacing may enhance the chance of response and LV reverse remodeling and may be considered in AF patients undergoing CRT implantation.

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2. Leclercq C, Gadler F, Kranig W, Ellery S, Gras D, Lazarus A, Clémenty J, et al. TRIP-HF (Triple Resynchronization in Paced Heart Failure Patients) study group. A randomized comparison of triple-site versus dual-site ventricular stimulation in patients with congestive heart failure. *J Am Coll Cardiol* 2008; 51:1455–1462.