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His-Bundle Pacing for Bradycardia May Cut HF Hospitalization Risk Compared With RV Pacing

Steve Stiles

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ORLANDO — Clinical outcomes, especially risk for heart failure (HF) hospitalization, were superior over several years for patients who received His-bundle pacing compared with conventional right ventricular (RV) pacing for bradycardia, in an observational cohort study.

The reduction in risk with His-bundle pacing, 29% overall, was even steeper within the subgroup of patients known to fare the poorest on RV pacing, those with a ventricular pacing burden exceeding 20%.

And overall with His-bundle pacing, the risk for HF hospitalization, a component of the primary endpoint along with death or upgrade to biventricular (BiV) pacing, fell a significant 37%.

His-bundle pacing is thought to avoid RV pacing–induced ventricular dyssynchrony because it demand-paces the ventricles by promoting "natural" His-Purkinje conduction.

And that's probably the mechanism behind the reduction in HF hospitalizations with His-bundle pacing in the study, Mohamed Abdelrahman, MD, Geisinger Heart Institute, Wilkes Barre, Pennsylvania, said when presenting the findings here at the American College of Cardiology (ACC) 2018 Annual Scientific Session.

For that reason, "It's the first thing we go for" when inserting a pacemaker for bradycardia, forgoing whenever possible a conventional RV pacing lead configuration, Abdelrahman told *theheart.org* | *Medscape Cardiology*.

He is also lead author on the report, published in the *Journal of the American College of Cardiology* to coincide with his live presentation. The authors compared the 2013-2016 experiences at two major affiliated centers, one of which favored His-bundle pacing and another that preferred standard RV pacing for patients with bradycardia-pacing indications.

"It's difficult to overstate how excited we are in electrophysiology about His-bundle pacing and what a wonderfully elegant solution this is to the problem of pacing-induced dyssynchrony," Kristen K Patton, MD, University of Washington, Seattle, said as a panelist after Abdelrahman's presentation. "It's hard not to want to do this in everyone."

Operators at the center favoring His-bundle pacing, which poses more technical challenges for lead placement and tends to require higher pacing thresholds compared with standard RV pacing, were able to institute it in about 92% of all comers, Abdelrahman pointed out.

That high rate reflected the center's long experience with the procedure, which it has championed because "we believe it's better than RV pacing. But we still need randomized controlled trials to confirm our hypothesis."

The success of His-bundle pacing remains very operator-dependent, and most centers that do it are able to engage it successfully about 80% of the time, observed NA Mark Estes, MD, Tufts University School of Medicine, Boston, Massachusetts. "So they're very good at it. I don't doubt they get over 90%," he told *theheart.org* | *Medscape Cardiology* about the Geisinger group.

But "those results cannot be reproduced in learning curves" at centers newly adopting the procedure. So when relating them to current practice, "that needs to be kept in mind," said Estes, an implantable-device guidelines coauthor and Heart Rhythm Society past president.

"This is the first registry that has shown a mortality benefit and a heart failure hospitalization benefit as well." Still, he cautions, studies looking at His-bundle pacing for bradycardia "have all been observational like this, so there's a lot of potential for confounders."

Chronic RV pacing is well recognized to promote ventricular dyssynchrony and LVEF deterioration, and there are various strategies for minimizing it depending on pacing indications. An RV-pacing burden greater than 40% was associated with more than a doubling of HF hospitalizations in the seminal MOST and DAVID trials from about 15 years ago.

Other studies have since put the RV-pacing burden threshold for increased risk at 20%, with little risk below that amount, according to Abdelrahman.

"What we saw that was very striking was that for heart-failure outcomes, there was a reduction associated with His-bundle pacing regardless of how much the ventricles were paced," he said.

That is, whether the comparison of the two cohorts was limited to those with less than 20%, 20% or more, or 40% or more ventricular pacing, the HF hospitalization rate was significantly reduced with His-bundle pacing. Regardless of ventricular

pacing burden, it was similar to patients with a less than 20% burden on standard RV pacing, Abdelrahman said.

The current analysis followed consecutive patients undergoing attempted His-bundle pacing and RV pacing for bradycardia, 332 and 433 patients, respectively. Among the patients, 56% were male, their mean age was about 76 years, and mean LVEF was 54.5%.

His-bundle pacing was successfully engaged in 304 patients (91.6%) while in the RV-pacing cohort, the lead paced from the RV apical position in 40.6% and nonapical RV locations in 59.4%.

All consistent with expectations, the His-bundle-paced group required significantly longer procedure and fluoroscopy times and higher voltage thresholds for capturing the ventricle both at implantation and by the end of follow-up.

A total of 220 patients reached the primary endpoint after a mean follow-up of 725 days.

Table. Hazard Ratio for Outcomes, His-bundle Pacing vs RV Pacing for Bradycardia, by Ventricular Pacing Burden

Endpoints	HR (95% CI), *P* Value		
	Overall	Ventricular Pacing Burden >20%	Ventricular Pacing Burden ≤20%
Primary endpoint[a]	0.71 (0.53 - 0.94), .02	0.65 (0.46 - 0.93), .02	0.78 (0.47 - 1.30), .34
HF hospitalization	0.63 (0.43 - 0.93), .02	0.54 (0.33 - 0.88), .01	0.88 (0.45 - 1.69), .69
All-cause mortality	0.73 (0.52 - 1.0 1), .06	0.69 (0.46 - 1.04), .07	0.64 (0.34 - 1.22), .17

HR = hazard ratio.

[a]Death, HF hospitalization, or upgrade to biventricular pacing.

There were three cases of pericardial effusion requiring pericardiocentesis in the RV pacing group and none in the His-bundle pacing group. One patient in each group developed infection necessitating device removal. None of the RV-paced patients required a battery change due to depletion compared with one in the His-bundle–paced group.

Only 2 patients in the RV-paced group required lead revisions, compared with 14 in the group getting His-bundle pacing. In the latter, 2 had the leads revised because of loss of capture or lead "microdislodgment," said Abdelrahman.

In the remaining 12 of the 14, he said, the His-bundle lead was revised at the implanting physicians' discretion after its pacing threshold had progressively increased.

Estes said many centers are now choosing His-bundle pacing selectively for patients whom they believe would otherwise take on greater than 20% burden of ventricular pacing.

"And if you've got a candidate for cardiac resynchronization therapy [CRT], and you can't get the left-ventricular lead in, which happens in about 10% of cases, then your backup position is to do His-bundle pacing," he said.

All that is helping to drive growth of the technique at experienced centers, even without randomized, controlled trials, according to Estes.

But seemingly everyone is ready for such a trial. "This is such a potentially important area, why didn't you do a randomized trial from the outset?" Martin Leon, MD, New York-Presbyterian/ Columbia University Medical Center, New York City, said from the panel after Abdelrahman's presentation of the study.

His-bundle pacing has been around the better part of 20 years "at select centers with people passionate about it," who are using "first-generation tools," replied Pugazhendhi Vijayaraman, MD, Geisinger Heart Institute, the study's senior author, from the audience.

"Now in the last few years we've gotten a groundswell of implanters doing permanent His-bundle pacing, and the number of implanters around the county and around the world actually is rapidly expanding, and we are ready for a randomized clinical trial," Vijayaraman said. But "industry support for this has not been forthcoming."

His-bundle pacing is also increasingly viewed as a potential alternative to CRT pacing for heart failure and is under evaluation for that use in ongoing His-Bundle Pacing Versus Coronary Sinus Pacing for Cardiac Resynchronization Therapy (His-SYNC) trial. It's comparing standard BiV pacing with His-bundle pacing in patients with conventional CRT indications.

Abdelrahman and Patton had no disclosures. Estes discloses receiving fees for consulting or honoraria from Boston Scientific, Medtronic, and St Jude Medical. Leon discloses receiving fees for consulting or honoraria from Abbott Laboratories, Boston Scientific, and Medtronic; receiving research grants from Edwards Lifesciences; and having equity or partnership interest in Claret Medical. Vijayaraman discloses being a speaker or consultant or being involved in research for Medtronic, serving as a consultant for Boston Scientific, and having a patent pending for a His-bundle pacing delivery tool.

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