RESEARCH LETTER

Impact of optimal septal pacing with a novel catheter delivery system

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The usefulness of septal pacing is still unknown. A previous study reported that 8% of fluoroscopy-guided lead placements in the ventricular septum were inadvertently placed in the free wall.[1] Another study demonstrated that when the lead was placed in the septum using a catheter delivery system (SelectSecure lead Model 3830 and C315 HIS catheter, Medtronic, Minneapolis, MN), right ventricular (RV) septal pacing achieved retrograde conduction through the cardiac conduction system and a short QRS duration ($\leq$132 ms) significantly associated with left ventricular synchrony.[2] Selectra 3D (Biotronik, Berlin, Germany) is a recently developed catheter-based lead delivery system with 2 perpendicular curves. A standard septal placement can be achieved quickly and efficiently with the Selectra 3D system, which has a nondeflectable sheath consisting of 3 different variant sizes.[3] The Selectra 3D Sheath is used for standard septal pacing, as opposed to deep septal pacing within the left bundle or at the level of the HIS. The most notable difference from the C315 HIS catheter is its 7.3F inner diameter and the use of conventional leads with the stylet lumen. In this study, we compared the QRS complex between Selectra 3D standard septal pacing and stylet-driven apical pacing.

This retrospective observational study included 72 consecutive patients who had undergone pacemaker implantation by 2 operators at our hospital between November 2020 and December 2021. The implantation was performed with either the Selectra 3D (n = 31) or a stylet (n = 41). The method of using Selectra 3D has been described previously.[3] In the stylet group, the lead was implanted in the RV apex under fluoroscopic guidance. An active lead fixation was used in both groups. We assessed the electrocardiographic (ECG) configuration and lead data. This paced QRS morphology as retrograde penetration pacing into the conduction system (RPP-CS) comprising wide and narrow components in the early and late phases, respectively. Thoracic computed tomography was performed in all patients during the follow-up period and was evaluated by a cardiologist, who was blinded to the method of lead implantation. This study was approved by the institutional review board and followed the principles of the Declaration of Helsinki. All patients provided written informed consent.

There was no difference in preoperative QRS duration between the 2 groups (Table 1). The postoperative QRS duration was significantly shorter and the postoperative QRS difference was significantly lower in the Selectra 3D group than in the stylet group (duration: 136 vs 155 ms, $P < .0001$; difference: 28 vs 47 ms, $P = .0003$). R-wave peak times (RWPTs) in leads I and V_6 were significantly shorter in the Selectra 3D group compared with those in the stylet group (lead I: 88 vs 98 ms, $P < .043$; lead V_6: 81 vs 97 ms, $P < .007$). The proportion of patients with short QRS duration ($\leq$132 ms) was significantly higher in the Selectra 3D group than in the stylet group (52% vs 10 %, $P = .0001$). There was no difference in R-wave amplitude or threshold between groups, whereas impedance was

KEY FINDINGS

- Selectra 3D (Biotronik, Berlin, Germany) is a newly developed catheter-based lead delivery system that allows accurate lead placement in RV septal pacing.
- RV pacing with Selectra 3D had a shorter QRS duration and RWPT and higher ratio of RPP-CS than that with a normal stylet.
- The Selectra 3D system can be useful in providing a fast and effective way to achieve physiological pacing in pacemaker patients when compared with standard stylet-guided pacing alone.

KEYWORDS Apical pacing; Cardiac resynchronization therapy; QRS duration; Physiological pacing; Septal pacing (Heart Rhythm O2 2022;3:393–395)

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Table 1 Comparison between Selectra 3D and stylet groups undergoing RV pacing

	All patients (n = 72)	Selectra 3D (n = 31)	Stylet (n = 41)	*P* value
Patient characteristics				
Age (y)	80 ± 9	79 ± 10	80 ± 8	.65
Height (cm)	157 ± 10	159 ± 9	155 ± 11	.29
Body weight (kg)	57 ± 12	56 ± 12	59 ± 12	.48
Male	36 (50)	18 (58)	18 (44)	.31
Sinus node dysfunction	31 (43)	15 (48)	16 (39)	.43
Atrioventricular block	37 (51)	14 (45)	23 (56)	.36
AF with slow ventricular conduction	4 (6)	2 (6)	2 (5)	1
Left ventricular ejection fraction (%)	67 ± 6	68 ± 6	66 ± 6	.17
Hypertension	33 (46)	15 (48)	18 (44)	.84
Diabetes	14 (19)	6 (19)	8 (20)	1
Coronary artery disease	11 (15)	3 (10)	8 (20)	.29
Valvular heart disease	8 (11)	3 (10)	5 (12)	1
Results of procedure				
Size of Selectra 3D				
Selectra 3D 40-S	1 (1)	1 (1)		
Selectra 3D 55-M	3 (4)	3 (10)		
Selectra 3D 65-L	27 (38)	27 (87)		
Septal pacing via CT	35 (49)	31 (100)	4 (10)	<.0001
Attempts to achieve ideal position	1.23 ± 0.6	1.31 ± 0.6	1.19 ± 0.5	.39
Time of RV lead implantation (min)	7.3 ± 2.9	8.1 ± 3.9	6.8 ± 1.6	.059
Total fluoroscopy time of pacemaker implantation (min)	13 ± 8.4	15 ± 7.8	12 ± 9.2	.25
R-wave amplitude (mV)	8.0 ± 3.8	8.0 ± 0.7	8.1 ± 1.0	.93
Impedance (Ω)	601 ± 92	625 ± 74	565 ± 115	.026
Threshold (V)	0.71 ± 0.24	0.73 ± 0.27	0.69 ± 0.19	.64
Pre QRS (ms)	108 ± 25	108 ± 28	107 ± 22	.96
Post QRS (ms)	146 ± 18	136 ± 23	155 ± 14	<.0001
Δ QRS (ms)	39 ± 20	28 ± 23	47 ± 20	.0003
Short QRS duration (≤132 ms)	20 (28)	16 (52)	4 (10)	.0001
RPP-CS	28 (39)	18 (58)	10 (24)	.004
R-wave peak time in lead I (ms)	93 ± 18	88 ± 17	98 ± 19	.043
R-wave peak time in lead V_6 (ms)	89 ± 20	81 ± 22	97 ± 19	.007

Values are given as mean ± SD or n (%) unless otherwise indicated.

AF = atrial fibrillation; CT = computed tomography; RPP-CS = retrograde penetration pacing into the conduction system; RV = right ventricle.

significantly higher in the Selectra 3D group (625 vs 565 Ω, $P = .026$). RPP-CS was observed in 18 cases (58%) of the Selectra 3D group. No complications including perforation or dislodgment occurred in either group.

The main finding of this study was that RV pacing with Selectra 3D had a shorter QRS duration and RWPT and higher ratio of RPP-CS than that with a normal stylet, without any difference in R-wave amplitude, threshold, or complications between the 2 groups. Jastrzębski et al[4] reported that utilizing the conduction system makes RWPT shorter. Our study suggests that septal pacing with Selectra 3D is expected to provide novel physiological pacing because of the short QRS duration and RWPT and higher ratio of RPP-CS compared to stylet-guided pacing. His-bundle pacing is recommended for patients with moderately reduced cardiac function and atrioventricular block. However, His-bundle pacing has limitations, including threshold, low success rate, lack of long-term data, and lack of reports on the safety of removal.[5] Septal pacing with Selectra 3D can obviate problems of His-bundle pacing resulting from the use of conventional leads.

In conclusion, Selectra 3D system can be useful in providing a fast and effective way to achieve physiological pacing via standard septal pacing in pacemaker patients compared with traditional stylet-driven lead placement alone.

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