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EDITORIAL COMMENT

Is Knowledge Always Power?*

The Curse of Knowing

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Left bundle branch area pacing (LBBAP) is overall safe, feasible, and a reliable method to achieve physiologic pacing.[1-4] Although His bundle pacing is the ultimate way to achieve physiologic pacing, LBBAP has several advantages over His bundle pacing as the most practical and widely used modality to achieve conduction system pacing. These include larger anatomical target during implantation and, as a result, greater short-term implantation success rate and better short- and intermediate-term lead threshold data.[2-6]

During the LBBAP implantation procedure, the septal lead unipolar pacing morphology, ring capture threshold, and occasionally a septogram performed via the delivery sheath are used to confirm the position and depth of the lead into the septum.[1,2,7] In this issue of *JACC: Case Reports*, Batul et al[8] demonstrate 2 examples of LBBAP lead implantation where the septogram showed contrast material draining through the lesser cardiac veins into the epicardial coronary venous system during fluoroscopy.

Case 1 demonstrates an example of a septogram performed during a stylet-driven septal lead implantation. There is staining of contrast material adjacent to the lead tip followed by drainage of contrast material through the lesser cardiac veins into the epicardial coronary vessels and the main body of the coronary sinus (CS). Case 2 is an example of deep septal lead implantation using a lumenless lead. There is staining of contrast material adjacent to the ring electrode that drains through septal perforators into the epicardial venous system and ultimately into the main body of the CS. There was no retention of residual contrast material in either case, and echocardiography immediately after the procedure and 3 months later did not show any pericardial effusion. Lead parameters were also stable in both cases at the 3-months follow-up visit.

Owing to the deep transseptal location of the pacing lead, there is a new set of potential complications that are unique to LBBAP as compared with the conventional right ventricular pacing lead. The complication rate during LBBAP lead implantation ranges from 1.63% to 14.1%, as noted in different studies.[2,3,9,10] In the largest to date registry-based multicenter observational study, the MELOS (Multicentre European Left Bundle Branch Area Pacing Outcomes Study) study (N = 2,533) of patients who underwent LBBAP, the overall rate of complications specific to the transseptal nature of the pacing lead was 8.3% in the experienced centers. These include, but are not limited to, intraprocedural perforation (3.67%) and delayed perforation (0.08%) into the left ventricular (LV) cavity, acute ST-segment elevation in multiple leads (0.24%), acute coronary syndrome (0.43%), coronary vein fistula (0.28%), coronary artery fistula (0.08%), chest pain 0.98%), and trapping of the LBBAP lead helix (0.43%). Interestingly, the dreaded complication of stroke/transient ischemic attack was not observed in this study, likely because of intraprocedural recognition of perforation into the LV cavity based on tip unipolar impedance drop during implantation and prompt repositioning of the lead. There were also 2 patients (0.08%) with delayed perforation into the LV cavity, however, and it is unclear whether they were receiving anticoagulant therapy. Other complications that are not unique to LBBAP include significant threshold rise from baseline (<1.5%) or increased threshold leading to

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repeated intervention (0.16%) and lead dislodgment (1.5%), which has been a greater concern with His bundle lead placement.[2,3,11]

Batul et al[8] demonstrate 2 cases of overall benign but potentially anxiety-provoking findings noted during the septogram performed at the time of LBBAP lead implantation. Although coronary arterial or venous fistula is a rare finding, as noted in the MELOS study, this is likely under-reported for various reasons.[3] A septogram is not always performed during septal lead placement. When an echocardiogram is performed after LV septal lead placement, the focus is usually on ejection fraction and hemodynamics. Rarely when the question arises whether the septal lead has perforated into the LV cavity, greater attention is paid to the lead position and depth in the septum, and color Doppler is not routinely used. Regardless, the consequences of small coronary arterial or venous fistula during LBBAP lead implantation even if present are unclear. It is possible that the repeated positioning if required with a stylet-driven lead with a larger diameter may be more traumatic than the more commonly used 4.1-F SelectSure 3830 lead (Medtronic); however, this hypothesis would need to be tested in further clinical trials. In this instance, the drainage of contrast material noted was a benign finding, possibly related to forceful injection of the contrast material.

Batul et al[8] should be commended for observing and reporting a phenomenon that could possibly have been overlooked. As the LBBAP with deep septal lead implantation is more and more widely adapted worldwide and different methods and tools are being developed to achieve the same physiologic result, having a keen eye for unusual phenomena during the procedure may allow early distinction of a benign from a potentially more consequential finding. Further studies looking at differences in complication rates related to specific type of lead design used at implantation are needed.

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