How to Perform His Bundle Pacing: Tools and Techniques

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KEYWORDS

• Pacemaker • Pacemaker implantation • Ventricular dyssynchrony • His bundle pacing • Implantation technique • Device programming

KEY POINTS

- Permanent His bundle pacing (HBP) has been increasing in popularity as a pacing strategy in recent years.
- It offers true physiologic pacing with recruitment of the native Purkinje system, thereby preserving atrioventricular and interventricular synchrony.
- Careful attention to various responses to pacing (selective, nonselective, and septal) must be made to achieve long-term success.
- This form of pacing offers unique challenges to existing sensing and capture algorithms; newer pacing algorithms and technology will be required to achieve lasting success.

TOOLS AND TIPS FOR HIS BUNDLE PACING

His bundle pacing (HBP) has been gaining increasing recognition as a permanent pacing strategy in clinical practice. It offers true physiologic pacing, where both atrioventricular and interventricular/intraventricular synchrony are maintained. Performing HBP can be technically challenging for beginners because there is a learning curve, mostly because of limited tools in the setting of variable anatomies. With some experience, the authors think it can be performed in close to 90% of patients as shown in recent study.[1] By selecting the right patient and using the available tools appropriately, one can achieve the desired results in the vast majority of cases. The various tools necessary for the procedure include the following:

Pacing Lead

- 3830 Select Secure MRI SureScan His lead (Medtronic, Minneapolis, MN, USA) has a lead outer diameter of 4.2 F (French) with a 1.8-mm exposed and active helix (Fig. 1). It is a 69-cm-long solid core lead and requires the use of an outer sheath for placement.

Sheaths

There are 2 specific sheaths:

- C315 His sheath (Medtronic): It is a nondeflectable sheath with an inner diameter of 5.5 F and an outer diameter of 7.0 F (Fig. 2). It is 43 cm long with a primary curve to reach the superior aspect of the tricuspid annulus and a secondary curve to reach the septum.
- C304-69 sheath (Medtronic): It is a deflectable sheath with inner diameter of 5.7 F and an outer diameter of 8.4 F with unidirectional deflection (Fig. 3). It can be helpful in challenging anatomic situations, such as dilated right atria and an inferiorly displaced HB. Disadvantages, compared with the C315 His sheath, include lack of a secondary septal

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Fig. 1. The 3830 Select Secure MRI SureScan His lead (Medtronic) has a lead outer diameter of 4.2 F with a 1.8-mm exposed and active helix. It is a solid core lead and requires the use of an outer sheath for placement. (*Reproduced with permission of* Medtronic, Inc.)

curve and difficulty stabilizing the lead as it is being screwed into the tissue.

A regular length 7 F peel-away sheath is used to place the His sheath through it. It allows for continued vascular access after the His sheath is split if needed.

ANALYZER

A pace-sense analyzer (PSA) is needed to record intracardiac electrograms (EGMs). The authors normally connect the pacing lead to the atrial channel of the Medtronic PSA because of the inherent sensing algorithms built into it. They use a higher gain setting of 0.05 mV/mm. For PSAs of other manufacturers, the lead is connected to the ventricular channel. Also, while assessing for His bundle recordings, the highest sweep speed possible should be used to better assess the local EGMs (Fig. 4).

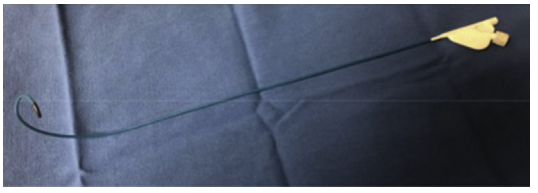

Fig. 2. C315 His sheath (Medtronic): It is a nondeflectable sheath with an inner diameter of 5.5 F and an outer diameter of 7.0 F. It is 43 cm long with a primary curve to reach the superior aspect of the tricuspid annulus and a secondary curve to reach the septum. (*Reproduced with permission of* Medtronic, Inc.)

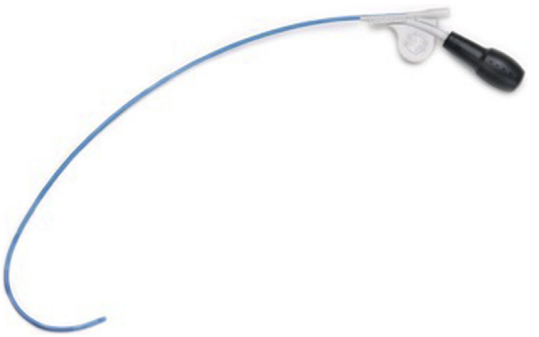

Fig. 3. C304-69 sheath (Medtronic): It is a deflectable sheath with inner diameter of 5.7 F and an outer diameter of 8.4 F with unidirectional deflection. Note the lack of a secondary septal curve. (*Courtesy of* Medtronic, Minneapolis, MN; with permission.)

ELECTROPHYSIOLOGY RECORDING SYSTEM

Even though during their early implant experience the authors relied on the PSA alone to perform the procedure, they have been using the electrophysiology (EP) recording system available in EP laboratories to perform the procedure. Connections can be made to record the local EGMs from the lead tip simultaneously on the PSA as well as the EP recording systems. Advantages include the ability to adjust filter and gain settings to better delineate the His bundle EGMs and also the ability to assess for selective versus nonselective His bundle pacing (N-HBP) based on the local evoked responses to pacing (Figs. 5 and 6).

MAPPING CATHETER (AS NEEDED)

Historically, an EP mapping catheter was routinely used to locate the HB. However, the authors routinely use the pacing lead to map the HB. If needed, the mapping catheter can be advanced from above. The use of a mapping catheter can be helpful where concomitant atrioventricular junction ablation and HBP are being performed. The His bundle EGMs can be marked with the ablation catheter (His cloud) before placing the lead.

Unipolar mapping technique is used during initial mapping with the pacing lead as the proximal pole is often inside the sheath to provide lead stability.