Advanced Catheter Concepts - The Specialty CS Diagnostic Catheter

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With advancement in the field of cardiac electrophysiology and specifically in the field of ablation, the need for new tools to ease and facilitate the mapping and ablation procedures is overdue.

Bard Electrophysiology has recently developed a new diagnostic catheter to further improve mapping during not only simple but also more complex supraventricular arrhythmias. The Specialty Coronary Sinus (SCS) catheter is a 6F, woven catheter available with either 20 or 14 poles. The electrode positioning features 2 distinct sets of electrodes separated by a spacing gap. (For example, the Bard model number 6FMC00789 has a distal group of 10 electrodes with 5-5-5mm spacing followed by a 42mm gap, then a proximal group of 10 electrodes with 5-5-5mm spacing.)

The SCS is finished with a proprietary distal curve, which is designed to facilitate cannulation of the Coronary Sinus (CS) using the right internal jugular vein approach.

Figure 1 shows the 20 pole variant of the catheter with the distal 10 poles placed in the coronary sinus (CS) and the proximal 10 poles placed in the High Right Atrium (HRA)

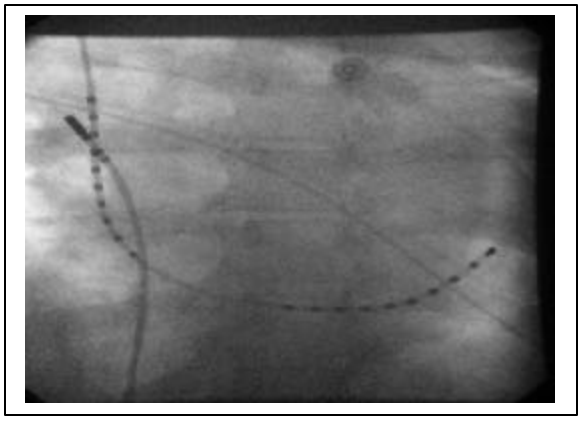

Figure 1

Saving extra hardware in the cardiac chambers and an extra puncture site

During a supraventricular arrhythmia, mapping and ablation procedure catheters are used to record activation potentials from the mid-, high right atrium, from the His-bundle, and the coronary sinus. Mapping of supraventricular arrhythmias using the SCS reduces the number of mapping catheters required per procedure, reducing procedure time and increasing patient safety.

The SCS records potentials/activation from the CS and the mid and high right atrium in addition to the Right Atrium – Superior Vena Cava (RA-SVC) junction, saving additional cannulation of instrumentation of the cardiac space, it also lowers the risk of cardiac injury and perforation associated with multiple instrumentation of the cardiac chamber.

Moreover, extra punctures may be associated with added risk of complications such as AV-fistulae and bleeding. Using the SCS, an extra femoral puncture would be saved leading to less risk of such complications.

Finally, utilizing the SCS for mapping procedures saves the operator significant procedure time, which would be a result of the time to place an extra sheath in the femoral vein and the time to position the extra catheter in the high right atrium.

Case Study

A 54 year old female is presented for mapping and ablation of her paroxysmal atrial fibrillation (AF). Patient has been suffering from AF for the last 3 years. Her number of AF episodes increased to 4-5 per week lasting between 1 and 8 hours. She would experience palpitations associated with fatigue and shortness of breath with the onset of AF. Failed flecainide, rhythmol, sotalol, and refused to take amiodarone. Patient presented for AF mapping and ablation.

Mapping and ablation catheters:
For the circular mapping intracardiac echocardiogram guided pulmonary vein isolation procedure, we utilized the SCS catheter to define the origin of the premature beats initiating AF. In addition to an 10.5F ICE catheter inserted from the left femoral vein, a standard RF ablation catheter and a 7F circular mapping catheter (Bard Orbiter® PV) were also inserted via the right femoral vein into the left atrium by applying double transseptal punctures.

"Technique Spotlight"
The SCS was inserted via an 8F sheath into the right jugular vein. After positioning the flouroscopy at 45° Left Anterior Oblique (LAO), the SCS was advanced into the right atrium (RA). Immediately after approaching the HRA, we started rotating the SCS in a counterclockwise manner towards the posterior and medial site of the right atrium where the CS os usually located. The goal of the operator was to continue rotating the SCS until its distal electrodes were lined up (perpendicular to the viewer) in the 45° LAO. This implied that the catheter was pointing towards the Coronary Sinus Ostium (CS os). We then slowly started advancing the SCS with simultaneous minimal counterclockwise rotation to allow engagement of the catheter into the CS. This was verified by recording potentials from electrodes 1 and 2, which revealed the specific CS recording, an atrial and a ventricular signal. Asking the patient to take a deep breath simultaneously with slight advancement of the SCS helped cannulate the CS and positioning the SCS far distal into the vein. After connecting the 20 pole SCS, recordings from the RA-SVC junction, HRA and the CS were demonstrated.

Isolating the Pulmonary Veins (PVs) and Mapping of non-PV focus:
After successful isolation of all PVs, extra beats initiating AF could still be documented. The activation sequence of the SCS revealed earliest activation to be between electrode 8 and 9. We then repositioned the circular mapping catheter at the posterior antral portion of the right inferior PV and proved a focus to be firing from that site, which was then successfully targeted. Then, during testing and by using burst pacing and isoprotrenol infusion, extra beats were unmasked. The earliest activation recorded per SCS was demonstrated at poles 16 and 17 which were positioned at the RA-SVC junction. We then placed the circular mapping catheter at the junction and completed isolation of the SVC. We then could not demonstrate Atrial Premature Contractions (APCs) despite burst pacing and high dose isopretorenol.

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