Near Zero X-Ray mapping approach with a novel ablation technology in SVT procedures: preliminary experience from the CHARISMA registry

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Introduction: Electrophysiological studies and ablation procedures expose both physicians and patients to a significant amount of radiation. Nowadays, most of 3-D mapping systems allow for improved tracking of catheters with possible reduction in radiation exposure. No data exists on the ability of a novel mapping system in minimizing fluoroscopy time and dose. To report preliminary data on feasibility and safety of a non-fluoroscopic approach using the Rhythmia mapping systems (Boston Scientific) and novel navigation-enabled ablation catheter in supraventricular tachycardia (SVT).

Methods: The 3-D atrial geometry was created from the navigation-enabled small tip ablation catheter and the Rhythmia mapping system. First, a quadripolar catheter was inserted through the femoral vein and advanced by 20 cm, as a stable reference for the field map. Secondly, the sensor-enabled ablation catheter was moved through the inferior vena cava into the right atrium (RA) creating 3-D anatomy and field map of RA. The coronary sinus (CS) ostium was identified and a decapolar catheter was inserted up to postero-lateral segments of mitral annulus. After reaching a stable position, the CS catheter was switched as the new internal reference for the field map. The anatomical map was completed through the ablation catheter and the quadripolar catheter was inserted in the right ventricle.

Result: 61 unselected consecutive cases of SVT were included in the study (33 AVNRT, 13 AFL, 10 AP and 5 other right atrial procedures). In all the cases, diagnostic EP and ablation catheters were positioned using only the near zero-ray guided mapping approach. During the study, a total of 1570 s of fluoroscopy was needed in 61 patients (26±73 s per procedure). Forty-four procedures (72%) were completed without any use of fluoroscopy, i.e. a totally zero-ray approach (ZFL). During the remaining 17 procedures (28%), 92±116 s of fluoroscopy were used. ZFL approach was more frequently obtained in case of AVNRT ablation (28, 85%) compared with AFL (7, 54%; p=0.05) and AP (4, 40%; p=0.009). The median reconstructed RA volume was 110[100-133] ml in a mean mapping time of 11±5 min. The
median number of radiofrequency ablations to terminate each arrhythmia was 4 [3-7] (total RF delivery time of 189[145-262] sec). A 100% rate of acute success was observed in our case series. No complications occurred.

Conclusion: In our preliminary experience, arrhythmias ablation through near zero fluoroscopy approach and the use of a novel ablation technology seems to be safe, feasible, and effective in common right atrial arrhythmias. Use of fluoroscopy can be completely avoided in most cases, without any reduction of the safety and effectiveness profile.