Ionizing radiation exposure trends in the cardiac electrophysiology laboratory: A single centre experience

Muzaffar Ali
Deepak Padmanabhan
Bharatraj Banavalikar
Sinam Inaoton Singh
Milan Kumar Ghadei
Sanjai Pattu Valappil
Jayaprakash Shenthar

Introduction: Most of the procedures done in a cardiac electrophysiology laboratory are done under fluoroscopic guidance. Over the years the number and the complexity of the electrophysiological procedures have increased, which also means increased ionizing radiation exposure and in turn increased risk of radiation injury to the patient, operators and other staff in the lab. One of the ways to reduce the ionizing radiation risk includes recording radiation exposure parameters and awareness of the same by the physicians delivering those exposures. Comparison of those exposures with the established norms also remains an integral part of the process.

Methods: The aims of this study were: (1) to quantify ionizing radiation exposure in cardiac implantable electronic device (CIED) implantation and catheter ablation (CA) procedures in a large series of patients and (2) to analyze the radiation exposure trend over the time.

Result: From September 2015 to December 2018, 3364 procedures were included in the analysis: 1616 procedures were device implantation procedures and 1748 were catheter ablation procedures. Single (pacemakers: 975; ICDs: 106) and dual chamber (pacemakers:439; ICDs:4) device implantation procedures and catheter ablation procedures without electroanatomic mapping (EAM) (n=1490; AVNRT: 967; AP ablations: 483; AT: 21) showed a significant decrease in the radiation exposure parameters as well as the procedure time over the study period. Cardiac resynchronization therapy (CRT) device implantation procedures (n=92) and catheter ablation procedures with EAM (n=258) showed a significant decrease in radiation exposure parameters over the study period except for Effective Dose in ablations with EAM. Procedure time did not change significantly in CRT implantation procedures but decreased significantly in catheter ablation procedures with EAM.

Conclusion: In this observational study we have been able to demonstrate that it is possible to significantly decrease radiation exposure in an electrophysiology lab by sticking to the standard practice of limiting radiation exposure as low as possible. As the number and the complexity of procedures done in an electrophysiology lab increases, it is imperative to employ methods that will decrease radiation exposure to the patients, operators and the support staff in the lab. We have demonstrated that using fluoroscopy routinely at 3.75 fps is feasible as well as significantly decreases radiation exposure.