Defining the substrate for ventricular tachycardia in ischemic versus non-ischemic cardiomyopathy.

Chrishan Nalliah
Ivana Trivic
Timothy Campbell
Saurabh Kumar

Introduction: Catheter ablation has emerged as an effective tool for management of ventricular tachycardia (VT) in structural heart disease amongst patients with ischemic (ICM) and non-ischemic cardiomyopathy (NICM). ICM and NICM comprise vastly different characteristics, largely informed by the underlying electrophysiologic substrate. However, data describing these differences are sparse.

Methods: We prospectively recruited 37 consecutive patients (ICM 51%, NICM 49%, age 66±12 years, male 82%) having catheter ablation with scar-related re-entrant VT with pre-dominant left ventricular (LV) involvement. All patients underwent high density voltage mapping of the LV prior to ablation. Off-line analysis was performed to determine LV low voltage and scar areas based on bipolar (low voltage < 1.5mV, scar < 0.5mV) and unipolar (low voltage < 8.3mV, scar < 3mV) criteria. Additionally, proportion of late potentials (LP), fractionated points, VT cycle length (CL) (clinical and procedural) and stimulation-QRS (stim-QRS) delays were recorded. Device interrogation and clinical follow up data were used to determine rates of recurrent VT following ablation.

Result: ICM was associated with a larger low voltage (bipolar 25±7% vs 15±5%, p<0.001 and unipolar 36±18% vs 26±21%, p<0.001) and scar areas (bipolar 21±9% vs 7±8%, p<0.001 and unipolar 24±14% vs 11±8%, p<0.001) compared with NICM. However, the proportionate increase in scar between bipolar and unipolar voltage was greater among NICM versus ICM patients (85±100% vs 20±77%, p=0.03). Larger scar areas in ICM was paralleled by higher proportion of complex electrograms (19±11% vs 9±9%, p=0.003). Furthermore, ICM associated with longer VT CL (max/mean clinical 395±61ms vs 331±62ms, p=0.005/378±66ms vs 322±54ms, p=0.01 and max/mean procedural 403±80ms vs 344±75ms, p=0.04/358±77ms vs 313±52ms, p=0.05) and greater stim-QRS delays (max/mean 91±51ms vs 42±17ms, p=0.002/77±40ms vs 33±9ms, p<0.001). VT storm was also more highly prevalent in ICM versus NICM (53% vs 6%, p=0.002). Following catheter ablation, 57% had VT recurrence after a single procedure, and 24% after multiple procedures. Single (37% vs 50%, p=0.49) and multi-procedure (16% vs 33%, p=0.20) recurrence rates were similar between groups.

Conclusion: The VT substrate in ICM versus NICM is characterized by slower VT, larger regions of low voltage/scar, greater proportion of complex points and longer stim-QRS delays. These data imply that the electrophysiologic VT substrate are different in ICM versus NICM. However, rates of VT recurrence are similar between groups.