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

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±12y, 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. Offline 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.