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OPTIMISING OUTCOMES IN CARDIAC RESYNCHRONISATION THERAPY (CRT): GUIDING LEFT VENTRICULAR LEAD POSITION AND DEFINING MECHANISM OF RESPONSE

A C Kydd,[1] F K Khan,[1] L M Liam,[1] L Ring,[1] P J Pugh,[2] M S Virdee,[3] D P Dutka[1]
[1]Addenbrooke's Hospital; [2]Addenbrookes Hospital; [3]Papworth Hospital

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Background Cardiac resynchronisation therapy (CRT) is an effective treatment for advanced heart failure. However, up to one-third of patients fail to exhibit a clinical response. We have recently demonstrated that directing the left ventricular (LV) lead to the region of latest mechanical activation, in viable myocardium, using speckle tracking radial strain echocardiography enhances clinical response and improves prognosis. The correction of mechanical dyssynchrony is proposed as one of the major mechanisms underlying the effect of CRT. A novel radial strain delay parameter derived from the net radial strain delay for the 12 basal and mid left ventricular (LV) segments (RSDc), based not only on timing but also amplitude of segmental strain may enhance understanding of CRT remodelling response. We present 4 year follow-up data according to LV lead location and relate the use of RSDc to LV remodelling response.

Methods We obtained follow-up mortality data for all 250 patients who received CRT between June 2008–June 2010 and were enrolled in the TARGET study or derivation group. The optimum site for the LV lead was defined using speckle tracking radial strain at baseline, prior to CRT. Final LV lead position was determined by fluoroscopy as concordant (CON, optimal segment), adjacent (ADJ, within one segment of optimal site) or remote (REM, >1 segment from optimal site). Response to CRT was defined as ≥15% reduction in end systolic volume. RSDc was calculated at baseline and 6 months following CRT, as the difference between peak and end-systolic radial strain (%) summed for each of the 12 non-apical segments.

Results In the 250 patients (median age 72 years; 88% NYHA class 3; QRS 157 ms; EF 23.3%; 53% ischaemic aetiology) lead position was CON 55%, ADJ 25% and REM 19%. The CON or ADJ LV lead position conferred a more favourable prognosis than REM up to maximum of 4 years follow-up (p=0.001, see figure). Patients with a concordant or adjacent LV lead demonstrated greater remodelling response than patients with a remote LV lead (LV end systolic volume reduction −24.3±15 vs −12.17±17). CRT responders had a higher baseline RSDc than non-responders (79%±33 vs 32%±20 p<0.001). There was a greater reduction in RSDc at 6 months in responders, compared with non-responders (−40%±35 vs −3.3%±26 p=0.001).

Conclusions Speckle tracking echocardiography can be used to define the optimum placement of the LV lead during CRT and to predict response. Optimum LV lead placement confers a survival benefit whereas pacing inappropriately appears to increase mortality risk. RSDc may provide a valuable tool for further understanding mechanisms of CRT response.

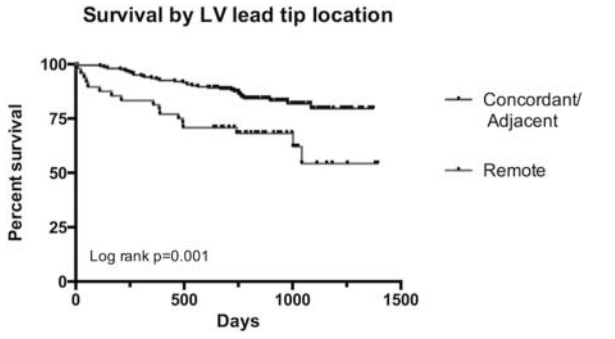

Figure 1