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Decline in echocardiographic optimisation of cardiac resynchronisation therapy (CRT) devices at Christchurch Hospital

Cardiac resynchronisation therapy (CRT) is a treatment for patients with abnormalities in regional left ventricular activation, and is recommended in patients with severe heart failure (NYHA functional class III or IV), poor LV function with an ejection fraction of less than or equal to 35%, and a wide QRS (greater than or equal to 120 ms).

According to an ASE Consensus Statement published in 2008, "Echo plays an evolving and important role in the care of heart failure patients treated with biventricular pacing. Echo techniques potentially aid in patient selection for CRT prior to implantation and optimise settings afterward".[1]

Noting an apparent decline in echo optimisation referrals, we performed an audit of all CRT devices (both CRT-pacemakers and CRT-defibrillators) implanted at Christchurch Hospital between 2004 and February 2012. Data was collected relating to indication for implant, paced atrioventricular (PAV), sensed atrioventricular (SAV) and ventricle to ventricle (V-V) intervals at both implant, and at 6 week checks. Left ventricular ejection fraction (LVEF) data from pre-implant, 6 week check and latest echo reports was also obtained.

From a total of 243 patients, data was considered in quartiles according to presentation order. The first quartile presented between January 2004 and January 2007, the second March 2007 and January 2009, the third January 2009 and July 2010 and the fourth July 2010 and February 2012. Patient demographics were reasonably consistent with the mean age of patients ranging across quartiles from 63 to 67 years and the percentage of male patients ranged from 65 to 75.

Between the third and fourth quartiles, there was a dramatic reduction in the percentage of devices undergoing optimisation—respectively 60%, 68 % and 62% of implants were optimised in the first three quartiles, with this dropping to 31% in the fourth quartile.

We also observed a steady decline in optimisations over the four quartiles where changes were made to CRT settings—37% of optimisations in the first quartile had changes made to CRT settings, 29% in the second, 24% in the third dropping to 20% in the fourth quartile.

In the patients that had changes made at optimisation, 72% had a change to the V-V interval and 47% had a change made to the PAV/SAV interval. In 29% of cases changes were made to both. There was no change in this pattern across quartiles.

We have found that at Christchurch Hospital, there has been a decline in the number of patients referred for echocardiographic optimisation of CRT and a decline in the percentage of these that have a change made as a result of echo optimisation.

Advances in CRT device technology and implant procedures leading to better optimisation at implant may be responsible. Levin et al have reported that for patients in sinus rhythm at CRT device implant, the interatrial conduction time measured at implant has a strong correlation with the echo derived optimal PAV and therefore this method could be used to program PAV intervals without the need for echo optimisation in these patients.[2]

There has also been a growing awareness of the limitations of echocardiography in CRT optimisation. Recent data suggests that routine echo optimisation is not beneficial.[3] In our practice it is now used in selected patients rather than in the majority.

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