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Intra-operative paced LV-RV interlead electrical delay and cardiac resynchronization therapy response

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Topic(s):
Cardiac Resynchronization Therapy

Citation:

BACKGROUND: Cardiac resynchronization therapy reduces morbimortality and improves heart failure symptoms in appropriately selected candidates. However, almost one third of patients remains non-responders. Optimization of programmed delays is one of the options for clinicians to manage non-responders. However, underlying electrical patterns of non response have been poorly described. We hypothesized that intra-operative paced LV-RV interlead electrical delay (\(\Delta pLV-RV\)) reflects electrical LV substrate.

METHODS: A total of 69 consecutive patients were implanted for CRT in our center (70% of males; mean age: 63+/−13Y, LV ejection fraction:25+/−6%; typical left bundle branch block(LBBB):65%, non ischemic cardiomyopathy (NICM):74%). Baseline mean QRS duration was 170+/−21ms, mean absolute QLV interval was 132+/−46 ms and 89% had a QLV ratio above=50%. Left (LVp-RVs) and right (RVp-LVs) paced delays were assessed intra-operatively. Delta (\(\Delta p\)) LV-RV was defined as the difference between the left and right delays. A positive value of \(\Delta p\) was interpreted as slower conduction velocities from the left lead when compared to the right. CRT response was defined as a reduction in LV end-systolic volume =15% compared to baseline.

RESULTS: Symmetrical or faster conduction velocities from left (\(\Delta p=0\)) were associated with NICM (X²:8;P=0.005) but not with type of block nor with LV and RV lead positions. With univariate analysis, asymmetrical and slower conduction velocities from the left (\(\Delta p>0\)) (OR:6.53; 95% CI[2.2-18.9];P=0.001), non-typical LBBB (OR:3.3; 95%CI[1.2-9.4];P=0.022) and ICM (OR:5.2;95%CI[1.6-17];P=0.006) were predictors of non-response. With multivariate analysis, both \(\Delta p>0\) (OR:9.74;95%CI[2.8-33.9];P<0.0001) and non-typical LBBB (OR:5.6;95%CI[1.5-20.3];P=0.009) were independent predictors of non-response. Compared to typical LBBB only, \(\Delta p=0+\) typical LBBB was a better predictor of CRT response (X² to enter:8;P<0.005;fig.).

CONCLUSION: Asymmetrical paced interlead electrical delays with slower conduction velocities from the left are strong predictors of non-response independently of the QRS width or the etiology of the underlying cardiomyopathy. Further studies are needed to correlate this electrical pattern with interventricular mechanical dyssynchrony.
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