Impact of left atrial volume in prediction of unfavorable response after cardiac resynchronization therapy

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Background: Dysynchrony of left ventricular (LV) viable myocardium was a mandatory condition for cardiac resynchronization therapy (CRT) in patients (Pts) with mild heart failure. CRT candidates, except for LV enlargement, often have dilated left atrium (LA) caused by varying degrees of mitral regurgitation (MR) or high filling pressures in severe diastolic dysfunction. The aim of our study was to assess the importance of LA size in predicting response to CRT in Pts in sinus rhythm (SR).

Methods: Our study involved 41 Pt, mean age 60.4 ±12.2, in follow-up from Jan 2007 until May 2012, with 68% of Pts treated for idiopathic cardiomyopathy (CMP), 22% for CMP of ischaemic origin and 10% with other types of CMP. Pts were in SR with left bundle branch block, functionally NYHA III class and had at least two out of three echocardiographic criteria for dysynchrony (interventricular, intraventricular or AV dysynchrony). After device implantation, percentage of biventricular pacing was 98.0 ±3.6%. In 6 months follow-up, Pts were grouped in responders and non-responders. Relevant criteria for evaluation of favorable CRT response were clinical improvement in > or =1 NYHA class, reduction of LV end-systolic volume for at least 10% and increase in LV ejection fraction.

Results: 78% of all Pts responded to CRT with statistically significant improvement in LV systolic function (EF: 26.3 ±8.5% vs. 41.0 ±11.0%; t=-6.52, p<0.001) and reduced LV end-systolic volume (182.5±68.3 vs. 109.4 ±58.5ml; t=7.49; p<0.001). Mean age during device implantation had no statistical significance in predicting CRT response (62.1 ±11.1 vs. 54.3 ±14.9 years; t=-1.719; p=0.093). In responders the significant majority had idiopathic CMP (72%) while CMP of ischaemic origin had lesser degree of response. Non-responders prior to CRT had higher volumes of LA comparing to responders (135.7 ±52.0 vs. 91.2 ±40.1 ml) as well as the severity of MR (MR area: 42.7 ±21.6 vs. 27.6 ±15.5 cm^2). In 6 months follow-up LA volume in non-responders has not changed (135.7 ±52,0 vs. 143.8 ±72.9 ml; t=-0.526; p=0.611) and there was also no statistically significant reduction in MR severity (MR area: 42.7 ±21.6 vs. 34.7±18.5 cm^2; t=2.62; p=0.039) but in responders LA volume has significantly decreased (91.2 ±40.1 vs. 74.2 ±31.4 ml; t=3.50; p=0.0014).

Conclusions: Pronounced left atrial dilatation and higher grades of MR prior to CRT were recognized in non-responder group, as well as lack of reverse remodeling of LA in follow-up. These two echocardiographic parameters are indicators of less favorable clinical response to CRT and therefore severe MR with two/three times increase in LA size could be used as predictor of outcome after CRT implantation.

KEYWORDS: resynchronization therapy, cardiac resynchronization therapy, left ventricular dysynchrony, left atrium size, mitral regurgitation.

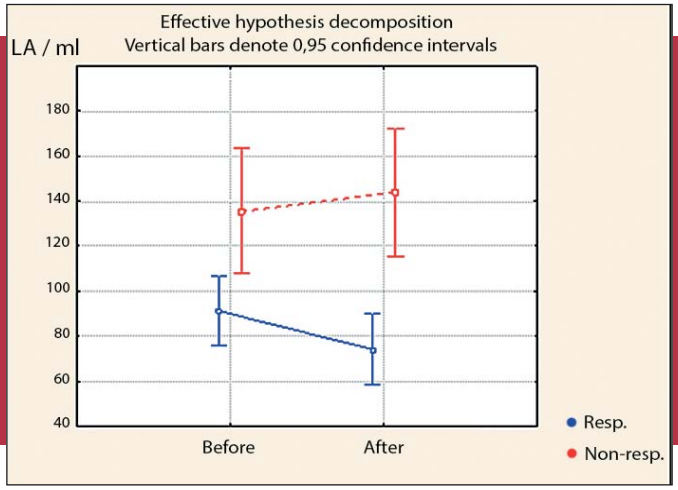

Figure 1. *Changes in the left atrial volume in responders and non-responders after cardiac resynchronization therapy.*

LA = left atrium; Resp. = responders; Non-resp. = non-responders;
x-axis = before and after cardiac resynchronization therapy; y-axis = LA volume in milliliters.

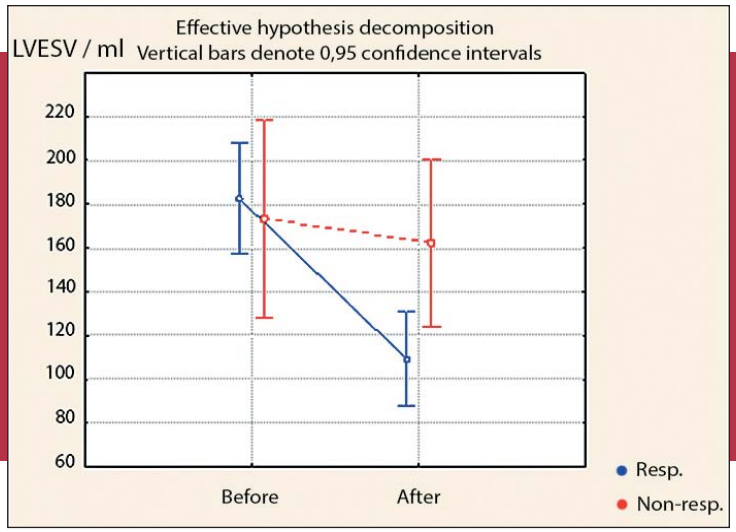

Figure 2. *Change in the left ventricular end-systolic volume in responders and non-responders after cardiac resynchronization therapy.*

LVESV = left ventricular end-systolic volume; Resp. = responders; Non-resp. = non-responders; x-axis = before and after cardiac resynchronization therapy; y-axis =LVESV in milliliters.

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