

# Summary

## Introduction

Chronic heart failure (CHF) is the subject of increased interest in the medical community, because of the high number of affected persons and also with regard to the resulting socio-economic impacts. Understanding the relationship between echocardiography and cardiac resynchronization therapy will allow better identification of potential responders and non-responders, which is very important because of the relatively high costs of this treatment.

## Objective

Based on our own experience and comparison with literature data to evaluate the importance of echocardiography in cardiac resynchronization therapy (CRT).

## Methods

One day before implantation, and at 3 and 15 months after implantation, we assessed: NYHA class, quality of life (QoL) and the 6-minute walk test (6MWT). In addition to a standard echocardiography, we assessed the presence of ventricular dyssynchrony and right ventricular (RV) systolic function by tricuspid annular plane systolic excursion and by pulsed tissue Doppler imaging (myocardial peak systolic velocity was measured at the tricuspid annulus). In 40 patients was compared echocardiographic, electrocardiographic and automated approach to optimization of biventricular pacemaker - interventricular delay (VV delay - VVD). Every patient in whom the quality of life, NYHA class and/or 6MWT improved (improvement of  $\geq 1$  NYHA class, 6MWT by more than 10%) and was neither in hospital for heart failure nor died for cardiac reasons was marked a clinical responder.

## Results

The study involved 143 consecutive patients in whom a biventricular system was implanted between 2005 and 2010. After 15 months 87 patients (62%) were marked as clinical responders to CRT and 56 patients (38%) as non-responders. A comparison of the initial parameters showed that these two groups differed significantly only in the RV systolic dysfunction (in non-responders the dysfunction was statistically more significant), and also in the degree of ventricular dyssynchrony (in the responders there were more statistically significant signs of intra- and interventricular dyssynchrony). In the group of responders we found that significant improvements in most clinical and echocardiographic parameters occurred after 3 months. In the group of non-responders clinical and echocardiographic parameters did not show any important changes, and no changes occurred between 3 and 15 months.

In the group of patients with a ventricular dyssynchrony before CRT implantation was observed significant improvement in most clinical and echocardiographic parameters. In the group of patients without dyssynchrony, we found no improvement in any of the monitored parameters. In patients with non-ischemic cardiomyopathy we observed significantly greater LV remodeling compared with a group of ischaemic cardiomyopathy. The effect of CRT in patients with sinus rhythm and atrial fibrillation was comparable. Also in the group of patients upgraded to biventricular stimulation we observed a comparable effect of CRT as in the group with primary CRT implantation.

None of the methods used for optimization of VV delay contributed to further improvement of CRT effect (number of clinical responders did not differ significantly in all groups). Also we did not find evidence of the importance of sequential versus simultaneous stimulation.

## Conclusion

Even with some limitations we consider echocardiography as very important and beneficial method to CRT effect prediction.

