

# Enhanced External Counterpulsation in Chronic Heart Failure: Where Do We Stand?

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Heart failure has been known as an increasing health burden worldwide and the prevalence is expected to rise more than 23 million in 2030. Chronic heart failure has characteristic of ventricular dysfunction which will cause dyspnea, fatigue, and finally some limitation in functional capacity and reduced quality of life.<sup>1</sup>

Recent advances in treatment of chronic heart failure may give us option of wide variety of modalities from pharmacologic and non-pharmacologic therapy with invasive and non-invasive approaches. Each has its own benefit and risk. Structural heart disease of heart failure indicates non reversible damage. Thus, treatment will aim to prevent symptoms and improve quality of life. Enhanced external counterpulsation (EECP) was a non-invasive treatment originally to reduce symptom of refractory angina.<sup>2-4</sup> In the newest European Society of Cardiology (ESC) guideline for management of stable coronary artery disease 2013, EECP had been approved as class IIa-recommended treatment for refractory angina.<sup>5</sup> Enhanced external counterpulsation (EECP) had been reported to improve myocardial contractility, increased stroke volume, enhanced angiogenesis and developing new collateral circulation. EECP produces pulsatile blood circulation which will increase endothelial shear stress and, thus, improved endothelial function. Some patients with ischemic heart disease and not eligible to have revascularization therapy due to increased risk may have recurrent angina symptom and shortness of breath. These patients are assumed to be good candidates for EECP

therapy.<sup>6</sup>

Actually, EECP is not a novel therapy. Since almost two decades ago EECP was given to patients with chronic heart failure on top of optimal pharmacologic therapy, not only to those with concomitant refractory angina pectoris. Some studies showed beneficial effect of EECP in heart failure but its efficacy is still controversial. The randomized controlled Prospective Evaluation of EECP in congestive heart failure (PEECH) trial involved 187 patients of ischemic and non-ischemic heart failure showed significant improvement in exercise tolerance but failed to show significant change in maximal oxygen uptake after six months post treatment.<sup>7</sup> Result from PEECH trial had been considered due to the placebo effect or training effect. The Multicentre study of EECP (MUST-EECP) and other similar studies showed that EECP is safe and effective for chronic heart failure.<sup>8-10</sup> The data from International EECP Patient Registry (IEPR) of 1097 patients with angina symptoms who were mostly not eligible for further revascularization therapy. Although there were significant improvement in symptoms, but the incidence of major adverse cardiac event (MACE) still high in the long term. It seemed that EECP could not modify disease process.<sup>11</sup>

A double-blind randomized clinical trial by Rampengan et al<sup>12</sup> in this journal tried to investigate the efficacy EECP in improving functional capacity in chronic ischemic heart failure. There were 99 patients involved and significant improvement was shown in the

EECP group. The result is in accordance with some studies of EECP, but its efficacy in the long term remains unknown.<sup>13</sup> The newest guidelines for management of heart failure 2013 had not yet mentioned EECP for heart failure treatment.<sup>14,15</sup> However, it had been showed beneficial effect of EECP in selected patients specially chronic heart failure with ischemic origin or refractory angina. Clinical benefit from EECP including reduced symptom, reduced re-hospitalization and reduced health cost.<sup>16</sup> Will EECP be recommended for chronic heart failure in the next guideline? Larger, longer and further studies on EECP in heart failure will certainly be needed. Meanwhile, patients who will have most benefit of EECP therapy must be well-selected. Alternative treatment options are widely open for the best therapy suitable for patients.

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