Impact of body composition analysis on prediction of short-term readmission events in heart failure: muscle wasting vs. obesity

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Background: Obesity, defined as higher body mass index (BMI), is associated with better prognosis in patients with chronic heart failure (CHF), though the presence of obesity is a risk factor of development of CHF (Obesity paradox). On the other hand, muscle wasting, i.e. reduction in skeletal muscle mass, is frequently observed in CHF, leading to lower exercise capacity and poor cardiovascular outcome.

Purpose: The aim of this study was to examine whether analysis of body composition improves prediction of short-term readmission rates in patients with CHF.

Methods: We retrospectively analyzed data for 167 consecutive HF patients who were admitted to our institute for management of HF and received a Dual-energy X-ray absorptiometry (DEXA) scan. Muscle wasting was defined as DEXA-measured appendicular skeletal muscle mass index <7.0 kg/m^2 in male and <5.4 kg/m^2 in female according to the Asian Working Group for Sarcopenia criteria. Obesity was defined according to the criteria by the use of DEXA-measured percent body fat mass: $>25\%$ in male, $>30\%$ in female. The primary endpoint was readmission due to cardiac events including worsening heart failure, arrhythmia, and cardiopulmonary arrest during a 180-days follow-up period after discharge.

Results: The mean age of the patients was 74 ± 13 years and 46% of them were male. The mean BMI was 21.8 ± 3.8 kg/m^2. Forty-seven percent of the patients were classified as NYHA functional class III. The most frequent etiology of HF was cardiomyopathy (30%), followed by ischemic heart disease (27%) and valvular heart disease (27%). The prevalence of muscle wasting and that of obesity were 69% and 59%, respectively. Patients with muscle wasting had lower BMI level, higher prevalence of NYHA functional class III and diabetes mellitus compared with those without muscle wasting. On the other hand, patients with obesity had higher prevalence of hypertension and dyslipidemia, higher level of BMI, fasting plasma insulin and triglyceride, and lower level of HDL-cholesterol compared with those without obesity. During the follow-up period, 34 patients (19%) were rehospitalized due to cardiac events. Kaplan-Meier survival curves showed that patients with obesity had a significantly lower readmission rate during a 180-days follow-up period than did the patients without obesity (14.3% vs. 29.0%, Log-Rank test, $p<0.01$). There was no difference in readmission rates between patients with and without muscle wasting (20.0% vs. 21.2%, $p=0.88$). In multivariate Cox regression analyses adjusted for age, sex, diabetes, and renal function, obesity was independently associated with lower readmission rates (hazard ratio 0.45, 95% confidence interval 0.22–0.93). However, the association between obesity and readmission rate was lost after the adjustment for NT-proBNP levels.

Conclusion: Body composition analysis by DEXA enables to find CHF patients with increased fat mass who have lower risk of short-term readmission.