

## Editorial

# Pre-operative Risk Stratification of Patients with Heart Failure Undergoing Elective Open Heart Surgery

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There have been various scoring models to assess prognosis and risk in patients with heart failure (HF). Exercise capacity reflected by peak oxygen consumption (peak  $\text{VO}_2$ ), the Heart Failure Survival Score (HFSS) and the Seattle Heart Failure Model (SHFM) have shown to effectively identify patients at high risk for clinical events and death in ambulatory HF patients [1-3]. Although HFSS and SHFM are powerful tools to estimate prognosis of patients with advanced HF, these models require several variables to calculate the score including those which may vary from day to day such as heart rate and blood pressure. Furthermore, both models include left ventricular ejection fraction (LVEF) as a co-variable, but the calculation of an exact LVEF by echocardiogram in HF patients can sometimes be challenging especially in patients with geometric abnormality or segmental asynergy [4,5]. From this point of view, the risk stratification model based on only a few objective variables would be of greater value in a clinical setting.

Having said that, the authors recently published several papers that introduced simple risk stratification tools to evaluate HF patients [4,6,7]. Of note, in these recent papers, the authors found the usefulness of the Model of End stage Liver Disease (MELD) scoring system, which can provide additional risk information in patients with ambulatory HF [6-8]. The MELD scoring system was first developed to predict mortality in patients undergoing transjugular intrahepatic portosystemic shunt procedures [9,10] and has since been verified as a measure of liver dysfunction, providing an objective score based on a patient's creatinine, total bilirubin, and international normalized ratio (INR). These three laboratory parameters are non-cardiac biomarkers representing hepatic and renal dysfunction and their impact on coagulation. This makes the MELD score suitable for the estimation of prognosis in patients with HF, which can reflect impaired peripheral circulation and non-cardiac organ damage. Furthermore, alternative MELD scoring systems may have improved prognostic efficacy [7]. The MELD-XI score excludes INR as a variable and, thereby, is more applicable for patients taking oral anticoagulant

medications [11]. In addition, the MELD-Na may improve prognostic efficacy by incorporating low sodium levels, which is also known to be associated with severity of HF [12]. In the previous observation, high MELD scores (>12) were strongly associated with poor survival at one year (MELD: 69.3% vs. 90.4%,  $p<0.0001$ ; and MELDNa: 70.4% vs. 96.9%,  $p<0.0001$ ) [7].

Based on the findings derived from the previous studies, we hypothesized that pre-operative MELD score could predict postoperative outcomes following open-heart surgery as well. The present institution of the authors is one of the biggest heart surgery centers in Japan. We therefore retrospectively investigated the impact of pre-operative MELD score on early postoperative outcomes in patients undergoing elective open-heart surgery. We reviewed over 300 consecutive patients undergoing elective heart surgery in 2013 at our institution. The mean value of the MELD score obtained from the total cohort was  $9.4\pm 4.3$ . Indeed, patients with high MELD scores (>12) were associated with longer intubation time and longer length of hospital stay ( $16.9\pm 15.9$  vs.  $13.8\pm 11.6$  days,  $p=0.0289$ ) as compared to those with low MELD scores ( $\leq 12$ ). In addition, high MELD score was associated with higher mortality rate (3.75 vs. 0.82%,  $p=0.0337$ ). In summary, we conclude that assessment of liver dysfunction using the MELD scoring system can be useful for predicting post-operative outcome, which may allow additional risk stratification in patients undergoing open-heart surgery. We are now collecting more detailed data and will report our further investigation as a full paper shortly.

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