Introduction:
The process of weaning from mechanical ventilation imposes an additional workload on the cardiovascular system, which may result in impaired myocardial function, increase in left ventricular filling pressure and respiratory distress. Among surgical patients, those undergoing heart surgery are particularly susceptible to cardiac dysfunction induced by weaning because of inadequate cardiovascular reserve. The aim of our study was to depict the pathophysiological changes assessed by echocardiography during the steps of weaning and to identify possible predictors of weaning failure (WF).

Methods:
We enrolled 34 consecutive patients undergoing isolated coronary artery bypass grafting in our institution. Data were obtained by intraoperative transesophageal echocardiography before sternotomy (T0) and by transthoracic echocardiography at the beginning of weaning (T1) and at the time of extubation (T2). WF was defined as deferral of planned extubation or respiratory failure needing reintubation or non-invasive mechanical ventilation within 48 hours.

Results:
WF occurred in 7 patients (20.6%) and involved manifestations of respiratory distress in 5 (14.7%). We found a significant association between left ventricle outflow tract-velocity time integral (LVOT-VTI) and ventricular-arterial coupling measured at T1 and WF, with LVOT-VTI emerging as the best predictor of WF with an area under ROC curve of 0.8669; an optimal cutoff value of 15 cm provided 100% sensitivity and 71% specificity. Significant increase in E/e’ measured at T2 (13.44 vs 9.96, P 0.02) suggested a cardiac etiology of respiratory distress in patients who failed the weaning trial.

Conclusion:
Our study showed that serial assessment of hemodynamic parameters by means of echocardiography is feasible in cardiac surgical patients and can provide insight into pathophysiological changes during weaning. Although these preliminary data need to be confirmed in a larger population sample, LVOT-VTI emerged as a promising predictor of subsequent WF.