

Usefulness of testing bolus technique for coronary CT angiography in patient with liver cirrhosis: revisit of contrast media hemodynamics

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PURPOSE: Since some coronary CT angiography (CCTA) of liver cirrhosis (LC) patients showed insufficient enhancement of coronary artery, difference of hemodynamics in LC patient may influence optimal enhancement of CCTA. The purpose of this study was to investigate hemodynamic changes in LC patient on CCTA and to improve optimal enhancement of CCTA in LC patient.

MATERIALS AND METHODS: Our study was initially included liver transplantation (LT) recipients who underwent for CCTA using testing bolus technique for preoperative evaluation of cardiovascular risk(disease group). CCTA of LT donors and patients for health screening using testing bolus technique were included (control group). Testing bolus images from CCTA were analyzed for time to peak, maximal housefield unit (MaxHU), baseline HU, relative enhancement ratio, upslope (HU/second), downslope (HU/second) at ascending aorta (AA), pulmonary artery (PA), and left atrium (LA) using dedicated software. Mean HU of region of interest (ROI) in AA, PA and LA were measured in CCTA. To compare cardiac function, Pearson's correlation was done between parameters of echocardiography (end-systolic volume (ESV), end-diastolic volume (EDV), ejection fraction (EF) and cardiac output (CO)) and calculated parameters from testing bolus images. To confirm improvement of maximal enhancement in CCTA, changed injection protocol was applied to CCTA of LT recipients (validation group). Changed protocol was increment of injection rate from 4 ml/sec to 5 ml/sec and total amount of contrast media from 60 ml to 75 ml.

RESULTS: Total of 131 CCTA were analyzed. (107 of disease group, 16 control group, and 8 validation group.) Mean CO of disease group (4579 ml/min) was significantly higher than control group (3180 ml/min). Calculated CO showed negative correlation with measured MaxHU and upslope at AA, PA and LA, respectively. Upslope and MaxHU was lower in disease group than control group. Upslope at AA and LA was also lower than control group. Mean HU of ROI at AA was lower in disease group. Validation group showed increment of mean HU at AA.

CONCLUSION: Testing bolus image reflected significant increment of cardiac output in LC patients. For CCTA in LC patients, it must be considered changing contrast injection protocol for optimal image quality.