The Correlation between B - lines Scores and Mean Pulmonary Artery Pressure in Post - Cardiac Surgical Patients.

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Abstract: Mean pulmonary artery pressure (mPAP) is a standard parameter, using for diagnosis of pulmonary hypertension (PHT). However, its measurement needs an invasive pulmonary artery catheter (PAC) placement. The B-lines are common lung artifacts associated with interlobular alveolar septa thickening; derive from non-invasive lung ultrasound (LUS) method. While the correlation between the B - lines and pulmonary capillary wedge pressure exist, the correlation between the B - lines and mPAP is not verified in cardiac surgical patients. We hypothesized that the B - lines score is correlated with mPAP, and might be a useful parameter for guiding diagnosis of PHT.

Methods: We conducted a prospective observational study in cardiac surgical intensive care unit (ICU), Phramongkutklao Army Hospital. We enrolled 32 post-cardiac surgical patients who received a PAC as part of standard care. LUS was performed in all patients within 6 hours postoperatively, and the sum of
B-lines was analyzed as international recommendation. Pulmonary artery pressure variables (systolic pulmonary artery pressure (sPAP), diastolic pulmonary artery pressure (dPAP), and mean pulmonary artery (mPAP)) were simultaneously recorded while LUS was performing. Primary outcome was the correlation between B-line scores and mPAP, secondary outcomes included correlation between B-lines scores vs. sPAP, dPAP, and 1-hr postoperative PaO2/FiO2 ratio. Linear regressions were analyzed using SPSS v.17.0. Result: All 32 patients were ASA class 3, and underwent elective cardiac surgery including coronary artery bypass graft surgery (CABG) (n = 28), valvular heart surgery (n = 2), and combined CABG with valvular heart surgery (n = 2). We found a significant correlation between B-lines scores and mPAP ($r^2 = 0.36$, $p < 0.001$), B-lines scores and sPAP ($r^2 = 0.2$, $p = 0.01$), and B-lines scores and dPAP ($r^2 = 0.1$, $p = 0.03$). There was no correlation between B-lines scores and 1-hr postoperative PaO2/FiO2 ratio ($r^2 = 0.03$, $p = 0.33$). Conclusions: In post-cardiac surgical patients, the B-lines scores significantly correlated with mPAP, sPAP, and dPAP. However, their correlation was weak. To guide diagnosis of PHT using the B-lines scores, further well-conducted studies with more number of patients, including patients with PHT, are needed to validate our findings.

References