

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

ยุทธจักร เจริญอิทธิกุล พ.บ.*,
พิมสาย คุณากร พ.บ.*,
เพชร วัชรสินธุ์ พ.บ.*

Abstract: Yutthachat Charoenitthikun M.D.*, Pimsai Kunakorn M.D.*, FRCAT, Petch Wacharasint M.D.*, FRCAT.

Department of Anesthesiology, Phramongkutklao Army Hospital, Bangkok, 10400.

Division of Surgical Intensive Care Unit, Phramongkutklao Army Hospital.

Background: Mean pulmonary artery pressure (mPAP) is a standard parameter, using for diagnosis of pulmonary hypertension (PHT).¹ 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,² 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.³ 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 score 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

- Galie N, Hoeper MM, Humbert M, Torbicki A, Vachiery JL, Barbera JA, et al. Guidelines for the diagnosis and treatment of pulmonary hypertension: the Task Force for the Diagnosis and Treatment of Pulmonary Hypertension of the European Society of Cardiology (ESC) and the European Respiratory Society (ERS), endorsed by the International Society of Heart and Lung Transplantation (ISHLT). *Eur Heart J* 2009;30:2493-537.
- Lichtenstein DA, Meziere GA, Lagoueyte JF, Biderman P, Goldstein I, Gepner A. A-lines and B-lines: lung ultrasound as a bedside tool for predicting pulmonary artery occlusion pressure in the critically ill. *Chest* 2009;136:1014-20.
- Volpicelli G, Elbarbary M, Blaivas M, Lichtenstein DA, Mathis G, Kirkpatrick AW. International evidence-based recommendations for point-of-care lung ultrasound. *Intensive Care Med* 2012;38:577-91.