Introduction:
We previously reported a simple correction method of estimating pleural pressure (Ppl) by using central venous pressure (CVP) and that it can be used to estimate Ppl and transpulmonary pressure in pediatric patients with respiratory failure. However, it remains unknown that this method can be applied to patients with various levels of chest wall elastance and/or intravascular volume. The objective of this study is to investigate whether our method is accurate in various conditions of chest wall elastance and intravascular volume.

Methods:
The study was approved by the Animal Care and Use Committee of Rakuno Gakuen University. Ten anesthetized and paralyzed pigs (43.2 ± 1.8kg) were mechanically ventilated and subjected to lung injury by saline lung lavage. Each pig was subjected to 3 different intravascular volume and 2 different intraabdominal pressures; in each condition, the accuracy of our method was tested. Specifically, airway flow, airway pressure (Paw), esophageal pressure (Pes), and CVP were recorded in each condition, then changes in Pes (ΔPes) and ΔPpl calculated using a corrected ΔCVP (cΔCVP-derived ΔPpl) were compared. cΔCVP-derived ΔPpl was calculated as κ × ΔCVP, where κ was the ratio of the ΔPaw to ΔCVP during the occlusion test.

Results:
Means and standard deviations of the two variables that reflect ΔPpl (ΔPes and cΔCVP-derived ΔPpl) in all pigs with all conditions were 6.1 ± 4.1 and 6.4 ± 5.3 cmH₂O. The Bland-Altman analysis for the agreement between ΔPes and ΔCVP showed a bias of -0.3 cmH₂O and a precision of 2.9 cmH₂O in all pigs with all conditions; a bias of 0.1, -0.7, -0.2 cmH₂O and a precision of 2.2, 3.6, 2.8 cmH₂O in low, normal and high intravascular volume, respectively; a bias of -0.3, -0.2 cmH₂O and a precision of 2.8, 3.1 cmH₂O in low and high intraabdominal pressure, respectively.

Conclusion:
Our method can estimate pleural pressure from CVP with a reasonable accuracy regardless of intravascular volume and intraabdominal pressure.
abdominal compression band, abd+: with an abdominal compression band