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Large difference between Enghoff and Bohr dead space in ventilated infants with respiratory distress

Masashi Zuiki[1], Rika Kume[1], Amane Matsuura[1], Kohei Mitsuno[1], Kazumasa Kitamura[1], Takuyo Kanayama[1], and Hiroshi Komatsu[1]

[1]National Hospital Organisation Maizuru Medical Center

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Abstract

Background: Ventilated neonates with respiratory distress may show a ventilation-perfusion (V/Q) mismatch. Objective: To evaluate the difference between the Bohr (Vd,Bohr) and Enghoff (Vd,Enghoff) dead spaces in infants by using volumetric capnography (Vcap) based on ventilator graphics and capnograms. Methods: This study enrolled 46 ventilated infants (mean birth weight, 2239 ± 640 g; mean gestational age, 35.5 ± 3.3 weeks). We performed Vcap and calculated Vd,Bohr and Vd,Enghoff when arterial blood sampling was necessary for treatment. Each measurement was classified according to the severity of acute respiratory distress syndrome (ARDS) by using the Berlin definition: severe or moderate ARDS, ratio of partial pressure of oxygen to fraction of inspired oxygen (P/F ratio) [?] 200; mild ARDS, 200 < P/F ratio [?] 300; and non-ARDS, 300 < P/F ratio. Next, regression analysis was performed to evaluate the correlation between the P/F ratio and the difference between Vd,Enghoff and Vd,Bohr. Results: Median Vd,Enghoff/tidal volume (VT) was significantly higher in the ARDS groups (severe or moderate: 0.60 [IQR, 0.49–0.68]; mild: 0.50 [0.43-0.59]) than in the non-ARDS group (0.45 [0.36-0.56]). The ARDS groups showed a large difference between Vd,Enghoff and Vd,Bohr (severe or moderate: median, 0.23 [0.15-0.30]; mild: median, 0.14 [0.09-0.21] vs. control: median, 0.09 [0.06-0.13]). The regression analysis for the relationship between P/F ratio and Vd,Enghoff - Vd,Bohr showed a negative correlation ($r = -0.55$, $p < 0.001$). Conclusion: Ventilated neonates with respiratory distress showed a large difference between Vd,Enghoff and Vd,Bohr, possibly reflecting a low V/Q mismatch and right-to-left shunting.

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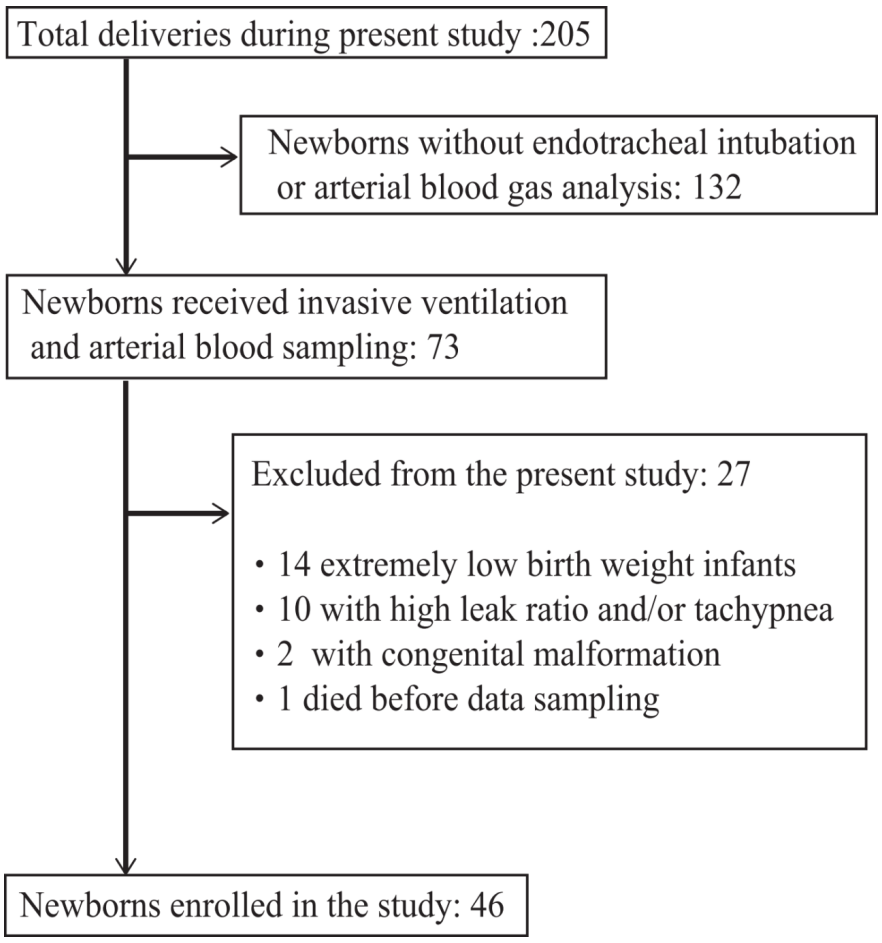

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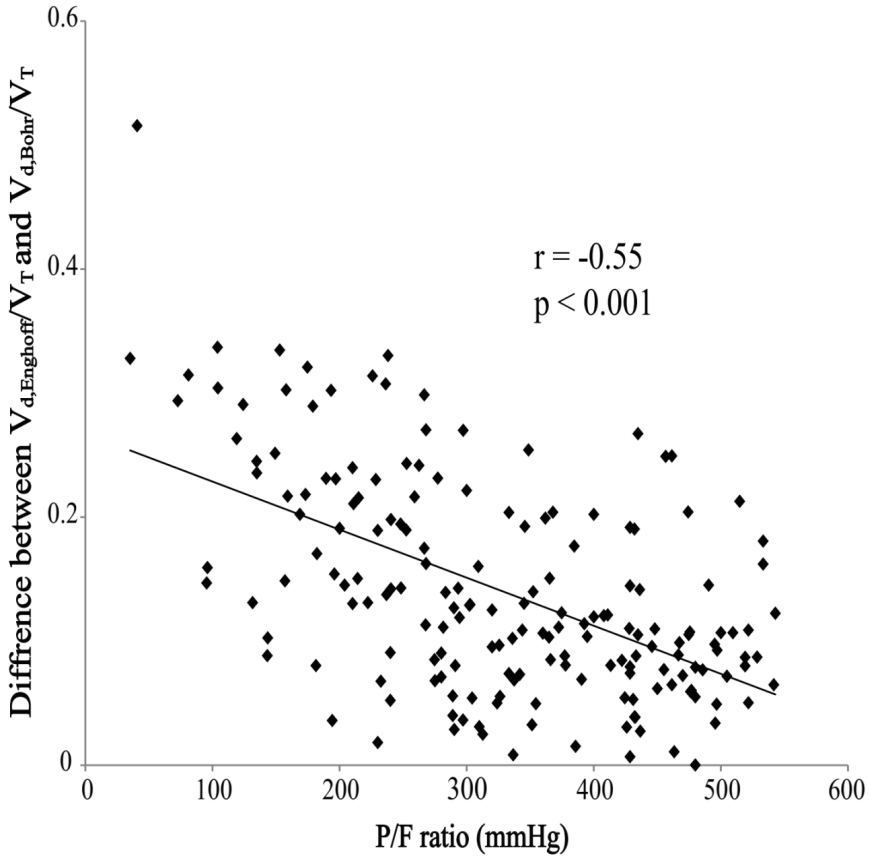

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