

[1535.608] Pressure Versus Volume Limited Sustained Inflations – How Should We Recruit the Preterm Lung?

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BACKGROUND: Sustained inflations (SI) achieve rapid aeration of the collapsed preterm lung and establish a functional residual capacity (FRC) immediately after birth. Pressure-limited SI's are common in clinical practice but the optimal manner in which to deliver a SI is unknown. The inflating volume delivered with a constant pressure is dependent upon the lung mechanics and may vary between patients. We hypothesized that a volume-limited SI would provide uniform aeration of the lung but result in variable inflation pressures.

OBJECTIVE: We aimed to determine if a volume-limited SI improved consistency of the FRC at end SI and improved ventilation homogeneity and reduced lung injury compared to a pressure limited sustained inflation.

DESIGN/METHODS: 131 d gestation lambs were resuscitated with 1 of 4 ventilation strategies: i) pressure limited SI (PressSI) to 40 cmH₂O over 5 s, held until 15 s; ii) surfactant prior to PressSI (SurfSI); iii) rapid volume limited SI (Rapid VolSI) to 15 mL/kg at 5 s held until 20 s; and iv) a Slow VolSI to 25 mL/kg at 19 s held until 20 s. Following SI, all lambs received 7 mL/kg V_T for 15 min. Lung mechanics, cerebral tissue oxygenation index (SctO₂; Fore-Sight NIRS), arterial pressures and gases were recorded regularly. Pressure-volume curves were performed in-situ post-mortem and early markers of lung injury assessed. Significance was determined using 1 way or 2-way RM ANOVA. **RESULTS:** Slow VolSI had lower PaCO₂ (p<0.05) than all other groups at 5 min. Blood pressures, SctO₂ and early markers of lung injury (EGR1, CTGF and CYR61) were not different between groups.

Results:	n	Vol (mL/kg)	Vol CV (%)	Press (cmH ₂ O)	Press CV (%)	Vol at 40 cmH ₂ O
PressSI	8	16.0 (6.7)	41.8	40.8 (1.2)	3.0	29.7 (6.4)
SurfSI	8	15.7 (6.2)	39.7	40.7 (0.6)	1.5	31.4 (7.0)
Rapid VolSI	7	14.6 (2.5)	16.9	50.2 (6.7)	13.3	28.2 (8.0)
Slow VolSI*	3	15.0	0.03	45.8 (2.3)	5.0	28.8 (1.6)

Data Mean (SD) Vol – volume; Press – pressure; CV – coefficient of variation. * reporting pressures achieved when 15 mL/kg V_T achieved.

CONCLUSIONS: Slow VolSI afforded balance between variability in volume delivered and pressures required. While being the most effective recruitment strategy for establishing FRC, the low sample size likely prevented significance.

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