[1535.589] Effects of Sustained Lung Inflations on Hemodynamics, Cerebral Perfusion and Oxygenation in the Small Adult Animal with Experimental Lung Injury

Hans Fuchs, Dominik Scharnbeck, Marc R. Mendler, Helmut D. Hummler. Department of Ped. Cardiology, Childrens Hospital, New Orleans, LA; Department of Medicine, University Medical Center, Ulm, Germany; Department of Neonatology, Childrens Hospital, University Medical Center, Ulm, Germany.

BACKGROUND: Sustained lung inflations (SIs) improve transition after birth. They are applied beyond neonatal age to recruit lung volume and to improve oxygenation.
OBJECTIVE: To determine the effects of SIs on cerebral perfusion and oxygenation in experimental lung injury beyond neonatal age.
DESIGN/METHODS: The experiments were performed in 6 adult ventilated NZW rabbits. The effects of a series of SIs of 20, 25 and 30 cm H_2O pressure for 15 s duration each on cerebral perfusion and oxygenation were determined by laser doppler flowmetry and local cerebral tissue oximetry in naive animals, after surfactant lavage and after additional fluid filling of the lung.
RESULTS: During SIs mean arterial blood pressure decreased by 73%, 52% and 32% and cerebral perfusion decreased by 73%, 39% and 30% in naive animals, after surfactant lavage and with additional fluid filling of the lung. Peripheral oxygen saturation was maintained in naive animals or increased during SIs after lung lavage and with fluid filled lungs, while cerebral tissue oxygenation decreased by 48% (naive), 8% (lavage) or increased by 81% (fluid filled lungs).

		baseline 1	SI 20 cm H_2O	SI 25 cm H_2O	SI 30 cm H_2O	baseline 2	
MAP (mm Hg)	naive	60(56-63)	34(31-35)	21(18-24)	16(15-21)	57(53-60)	#
	lavage	54(51-55)	38(34-43)	28(25-33)	26(23-30)	60(57-66)	#
	lavage/fluid filled	40(35-43)	35(33-35)	31(31-33)	31(29-36)	44(43-53)	*
SpO_2 (%)	naive	98(96-98)	98(97-98)	98(97-98)	98(98-98)	98(97-99)	ns
	lavage	76(75-79)	76(75-78)	82(80-84)	89(86-92)	82(79-82)	*
	lavage/fluid filled	54(42-60)	47(40-52)	64(48-69)	88(76-96)	62(47-69)	#
Cerebral perfusion (AU)	naive	100(100-100)	68(59-69)	39(31-45)	27(22-35)	108(98-116)	#
	lavage	100(100-100)	77(69-85)	62(51-72)	61(45-66)	107(105-109)	#
	lavage/fluid filled	100(100-100)	89(80-93)	72(65-87)	70(57-99)	111(95-128)	*
$PctO_2$ (mm Hg)	naive	21(17-24)	19(14-24)	16(11-22)	11(9-19)	19(14-24)	*
	lavage	12(11-16)	12(11-14)	11(11-13)	11(9-13)	13(12-16)	ns
	lavage/fluid filled	11(8-20)	9(7-14)	11(8-14)	20(15-25)	13(12-18)	*

Median (interquartile ranges); MAP: mean arterial blood pressure; SpO_2: oxygen saturation; $PctO_2$: cerebral tissue partial pressure of oxygen; AU: arbitrary units; *: $p<0.05$; #: $p<0.001$; ns: not significant (RM ANOVA)

CONCLUSIONS: SIs of 15 s duration may impair cerebral perfusion in adult animals with mature circulation. This may cause impairment or improvement of cerebral tissue oxygenation depending on baseline conditions.
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Board: 589
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