

Unexpected hemodynamics at extreme levels of PEEP

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Background: The hemodynamic effects of PEEP have largely been studied, but pushing the system to its limits often reveals some interesting findings which may not line up with the current knowledge. Here we show and try to explain a peculiar behaviour of systemic vascular resistences at extreme levels of PEEP.

Methods: 2 groups of healthy piglets (24.2 ± 1.96 kg) were sedated and mechanically ventilated for 48 hours at similar values of mechanical power (21.2 ± 11.5 vs 20.7 ± 7.9 J/min), but with different levels of PEEP: 5 cmH₂O in the first group (28 animals) and 25 cmH₂O in the second one (14 animals). Hemodynamic parameters were recorded all along the experiment.

Results: CVP, pleural pressure and need for fluids and vasopressors were significantly higher in pigs with higher PEEP. Stroke volume, heart rate and arterial pressure were too influenced by the amount of sedation and catecholamins for us to draw any conclusion, but systemic vascular resistences (SVR) showed a peculiar behaviour: even when corrected for sedation and catecholamins they were strikingly lower in the high PEEP group (Figure 1) . A similar, but less evident, difference could be observed in dynamic arterial elastance (PPV/SVV).

Discussion: Extremely high levels of PEEP are associated with very low SVR. This effect is not easily explained. We supposed that, for the same stroke volume, the stress in the aortic wall would be greater in pigs with higher intrathoracic pressure. This would lead the aortic baroreceptor to fire at a faster rate, increasing the parasympathetic tone. The fact that the difference in dynamic arterial elastance between the two groups was not so evident is in favour of a high aortic stiffness even in the context of a vasodilated peripheral vascular bed. In spite of the possible explanations these findings deserve to be further explored in future studies.

Systemic resistances

