Maintenance of end-expiratory recruitment with increased respiratory rate after saline-lavage lung injury

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To the Editor: In the intriguing report by Syring et al. (3), the authors concluded that comparable reductions in tidal recruitment were obtained by either applying external positive end-expiratory pressure (PEEP) or by increasing respiratory rate. This latter conclusion deserves scrutiny, but their data seem not to support it. First, the reported time constant (0.47 s) of the oxygen probe used (1) is too long. By considering the short equilibrium time available in the high-rate group (inspiratory time = 1.66 s/expiratory time = 0.83 s), one could predict that this catheter measured only 82.5% of the actual arterial Po2 oscillations in these animals. In the best scenario, part of the decrease in arterial Po2 oscillations in the high-rate group should be ascribed to insufficient temporal resolution of the catheter. The same group, however, had previously shown that arterial Po2 changes following massive alveoli recruitment or derecruitment required 10–20 s to stabilize (1). By considering such longer time constants, the perceived swings in arterial Po2 would be just 13% of those in equilibrium. Therefore, respiratory rate should have a profound impact on the measured amplitude of arterial Po2 irrespective of the amount of tidal recruitment. Another important methodological limitation was the high plateau pressure used (28 cmH2O). Under low-PEEP conditions, such high inspiratory pressure in rabbits commonly exceeds the reopening pressure and results in tidal recruitment (2), which increases lung capillary Po2 each inspiration, resulting in a higher average arterial Po2 especially when inspiration is long (inspiratory time = 1.66 s). In this context, a high average arterial Po2 in the high-rate group was not enough to guarantee a permanently open-lung status. To prove that, the authors should demonstrate a high average arterial Po2 even after decreasing plateau pressures substantially.

REFERENCES

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