Respiratory safety of ventilation synchronised with chest compressions: importance of the population evaluated

Seguridad respiratoria de la ventilación sincronizada con compresiones torácicas: importancia de la población evaluada

To the Editor,

We read with interest the SYMEVECA study subanalysis by Hernández-Tejedor *et al.*[1], which addresses an important issue: respiratory outcomes and complications according to the ventilation strategy used during out-of-hospital cardiac arrest. The higher PaO_2/FiO_2 ratio observed with chest compression–synchronized ventilation (CCSV) is a promising finding. Nevertheless, we believe that the conclusion regarding respiratory safety should be expressed more cautiously, because pneumothorax and subcutaneous emphysema were analyzed only in patients for whom radiological assessment was available.

Of the 521 patients enrolled in SYMEVECA, 278 were transported to hospital and 210 ultimately underwent radiological assessment: 41 receiving CCSV, 65 receiving intermittent positive-pressure ventilation (IPPV), and 104 receiving bag-mask ventilation. Thus, the reported rates of pneumothorax or subcutaneous emphysema (1/41, 7/65, and 7/104, respectively) describe events detected in patients who survived long enough to undergo chest imaging, rather than necessarily the incidence in the entire population exposed during resuscitation. Without imaging or autopsy, complications arising before or around the time of death could have gone undetected.

This distinction affects the estimand. Restricting the analysis to patients who survived to radiological assessment conditions the estimate on an event occurring after exposure. This may introduce selection bias, including survivor bias and collider-conditioning bias.[2] In populations with high mortality, adverse events observed only among survivors may not adequately reflect the joint relationship between death and complications; consequently, an approach integrating both outcomes in the full sample has been proposed.[3]

Furthermore, the small number of events limits the precision of the comparison. The adjusted estimate for CCSV vs the other strategies was based on 15 events and had a wide confidence interval (OR, 0.31; 95% CI, 0.03–2.72). A statistically nonsignificant result with this degree of imprecision should not be interpreted as evidence of no difference.[4] This caution is reinforced by recent experimental data: in a randomized porcine model of prolonged cardiopulmonary resuscitation, CCSV improved arterial oxygenation but was associated with more pneumothoraces detected on postmortem computed tomography.[5]

Finally, the interpretation of PaO_2/FiO_2 would be more robust if the ventilatory conditions at the time of blood gas analysis were reported and variables such as positive end-expiratory pressure (PEEP), FiO_2, duration of resuscitation, and use of mechanical compressions were considered. Accordingly, the available data support a more limited conclusion: among patients who survived to radiological assessment, CCSV was not associated with a statistically significant increase in detected pneumothorax or subcutaneous emphysema. Pending studies that systematically assess all exposed patients, CCSV should be considered a promising strategy to improve oxygenation, but its respiratory safety cannot be fully established in the overall treated population.

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