Association of arterial carbon dioxide and pH with hospital mortality after cardiac arrest

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PURPOSE OF THE STUDY: Arterial carbon dioxide tension (pCO₂) is a possible modifiable parameter that could contribute to survival after cardiac arrest. The purpose of our study was to determine pCO₂ and pH in our patient population.

MATERIALS AND METHODS: We performed a retrospective study in adult patients after non-asphyxial out-of-hospital or in-hospital cardiac arrest, who were admitted in 2015 and 2016. We collected data on the highest pCO₂, the lowest pH and the highest lactate in the first 24 hours after admission.

RESULTS: We included 153 patients. 109 (71.2%) were males, mean age was 64 ± 13 years, and 62 (40.5%) patients survived to hospital discharge. We observed no significant differences in pCO₂ between survivors and non-survivors (7.1 ± 2.2 kPa vs. 7.3 ± 2 kPa, p = 0.62), and a significantly lower pH (7.2 ± 0.1 vs. 7.1 ± 0.1, p < 0.0001) and higher lactate (4.9 ± 3.1 mmol/l vs. 8.5 ± 5.5 mmol/l, p < 0.0001) in non-survivors. We observed hypocapnia (pCO₂ < 4 kPa) in 1.6% of survivors and 1.1% of non-survivors, normocapnia (pCO₂ 4.5–6 kPa) in 19.4% vs. 14.3%, mild hypercapnia (pCO₂ 6.5–8 kPa) in 38.7% vs. 16.5% and severe hypercapnia (pCO₂ > 8 kPa) in 19.4% vs. 25.3%. We observed a trend towards lower mortality in patients with mild hypercapnia (OR 0.3 [95% CI 0.13–0.67, p = 0.003]). Severe acidosis (pH < 7.1) and hyperlactatemia (lactate >4 mmol/l) were observed in 12.9% and 47.5% of survivors, and 30.8% and 69% of non-survivors, and were associated with a trend towards greater mortality (OR 3.0 [95% CI 1.26–7.13, p = 0.01], and OR 1.9 [95% CI 0.86–4.49, p = 0.11], respectively).

CONCLUSIONS: Derangements in arterial pCO₂ and pH are common in survivors after cardiac arrest, however, it seems that metabolic acidosis associated with hyperlactatemia, and not elevated pCO₂ contributed to mortality in our patient population.