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Letter to the Editor

The importance of pre-hospital interventions for prevention and management of witnessed hypothermic cardiac arrest

Sir,

We are grateful for the comprehensive review on rescue collapse in hypothermic patients recently published in this journal by Frei et al.[1] The authors included 206 patients with witness hypothermic cardiac arrest (CA) and reported body temperature (without specifying measurement location) plus pre-arrest clinical characteristics. The authors classified CA as rescue collapse, even if potential risk factors for triggering are reported in only 62 cases (i.e. mobilization, transfer and invasive maneuvers like endotracheal intubation), and it is not clear when and where the remaining cases occurred. When a hypothermic patient is transported, he/she is at risk of a further decrease in core body temperature (afterdrop) due to heat redistribution within the body, e.g. due to abrupt peripheral rewarming or patient movement. Additionally, insufficient heat-loss prevention measurements after rescue and during transport allow continuous cooling. However, the exact mechanism leading to rescue death is not clear. Cooling of the heart itself due to afterdrop, and/or a reduction in venous return, and/or rough movements of the trunk and extremities are hypothesized to trigger rescue collapse. Indeed, animal models have confirmed that severe cardiac hypothermia can induce fatal dysrhythmias and asystole, both with and without mechanical stimulation.[2] Moreover, patients with witnessed CA after rescue from cold-water immersion/submersion were reported[1]: the most likely cause of circumrescue collapse in these cases is a sudden increase of the unstressed venous volume and a subsequent decrease in cardiac preload and cardiac output owing to the abrupt reduction of hydrostatic pressure after removal from the water and a vertical rescue position during lifting up.[3] Therefore, it should be promoted higher attention to simple pre-hospital procedures like adequate insulation, careful handling and horizontal rescue position, in parallel with clinical and instrumental monitoring.

Unexpectedly, a substantial proportion of patients in the study by Frei et al. had asystole as the initial cardiac rhythm.[1] Traditionally, ventricular fibrillation was thought to be the initial rhythm in hypothermic CA and asystole to occur later and at lower temperatures.[4] However, the temperature ranges reported in the study were similar between patients with shockable and non-shockable rhythms.[1] Interestingly, also the survival rate of patients with asystole was comparable to that of patients with shockable rhythm. This clearly suggests that in case of witnessed hypothermic CA, patients should be brought to a facility with the capability to perform extracorporeal rewarming, regardless of the initial rhythm. Application of predefined standard operating procedures (SOPs) can guarantee straightforward advanced life support measures at the scene and throughout transfer to the closest extracorporeal life support (ECLS) center (if indicated). Proposed SOPs for accidentally hypothermic patients in CA suggest to avoid prolonged advanced life support at the scene and consider to switch from a 'stay and play' to a 'stay not much and run to an ECLS center' concept.[5] Such strategy can optimize resuscitation from the scene to the ECLS center and enable prompt placement of ECLS at admission. Conversely, the Hypothermia Outcome Prediction after ECLS (HOPE) survival probability score could support the in-hospital triage by ECLS team.[1]

Conflict of interest

Authors have no conflict of interests to be disclosed.

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