

Persistent Peripheral and Microcirculatory Perfusion Alterations after Out-Of-Hospital Cardiac Arrest are Associated with Poor Survival*.

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Introduction

Objective: To evaluate sublingual microcirculatory and peripheral tissue perfusion parameters in relation to systemic hemodynamics during and after therapeutic hypothermia following out-of-hospital cardiac arrest.

Methods

Design: Prospective observational study. *Setting:* Intensive cardiac care unit at a university teaching hospital. *Subjects:* We followed 80 patients, of whom 25 were included after out-of-hospital cardiac arrest. *Intervention:* In all patients, we induced therapeutic hypothermia to 33°C during the first 24 hrs of admission.

Measurements and Main Result

Complete hemodynamic measurements were obtained directly on intensive cardiac care unit admission (baseline), during induced hypothermia (T1), directly after rewarming (T2), and another 24 hrs later (T3). In addition, the sublingual microcirculation was observed using sidestream dark-field imaging, and peripheral tissue perfusion was monitored with the peripheral perfusion index, capillary refill time, tissue oxygen saturation, and forearm-to-fingertip skin temperature gradient. During hypothermia, all sublingual microcirculatory parameters decreased significantly together with peripheral capillary refill time and the peripheral perfusion index, followed by a significant increase at T2. Changes in sublingual and peripheral tissue perfusion parameters were significantly related to changes in central body temperature, but not to changes in systemic hemodynamic variables such as cardiac index or mean arterial pressure. Surprisingly, these parameters were significantly lower in nonsurvivors ($n = 6$) at admission and after rewarming. Persistent alterations in these parameters were related with the prevalence of organ dysfunction and were highly predictive of mortality.

Conclusions

Following out-of-hospital cardiac arrest, the early postresuscitation phase is characterized by abnormalities in sublingual microcirculation and peripheral tissue perfusion, which are caused by vasoconstriction due to induced systemic hypothermia and not by impaired systemic blood flow. Persistence of these alterations is associated with organ failure and death, independent of systemic hemodynamics.