

Case Conference

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Discussion

Something about therapeutic hypothermia in cardiac arrest

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The Timing of Hypothermia

- ◆ Animal model: < 1hr → better outcome
- ◆ The timing of hypothermia induction is not associated with neurological outcome after discharge
- ◆ Compare to normothermia, both have better outcome (2 hrs vs. 8 hrs)

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Duration

- ◆ At least 12 hrs, may be >24 hrs
- ◆ No adult study now for longer duration
- ◆ Up to 72 hrs for newborns was used safely
- ◆ Cooled to 32 to 34 °C for 12 to 24 hrs (Class I)

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Table 1. Multiple System Approach to Post-Cardiac Arrest Care

Ventilation	Hemodynamics	Cardiovascular	Neurological
<ul style="list-style-type: none"> • Capnography • Rationale: Confirm secure airway and titrate ventilation • Endotracheal tube when possible for comatose patients • <u>PiO₂—35–40 mm Hg</u> • <u>PiO₂—40–45 mm Hg</u> • Chest X-ray • Rationale: Confirm secure airway and detect causes or complications of arrest, pneumonia, pneumothorax, pulmonary edema • Pulse Oximetry/ABG • Rationale: Maintain adequate oxygenation and minimize FiO₂ • <u>SpO₂ ≥94%</u> 	<ul style="list-style-type: none"> • Frequent Blood Pressure Monitoring/Arterial-line • Rationale: Maintain perfusion and prevent recurrent hypotension • Mean arterial pressure ≥65 mm Hg or systolic blood pressure ≥90 mm Hg • Treat Hypotension • Rationale: Maintain perfusion • Fluid bolus if tolerated • Dopamine 5–10 mcg/kg per min • Norepinephrine 0.1–0.5 mcg/kg per min • Epinephrine 0.1–0.5 mcg/kg per min 	<ul style="list-style-type: none"> • <u>Continuous Cardiac Monitoring</u> • Rationale: Detect recurrent arrhythmias • No prophylactic antiarrhythmics • Treat arrhythmias as required • Remove reversible causes • <u>12-lead ECG/Troponin</u> • Rationale: Detect Acute Coronary Syndrome/ST-Elevation Myocardial Infarction, Assess QT Interval • Treat Acute Coronary Syndrome • Aspirin/heparin • Transfer to acute coronary 	<ul style="list-style-type: none"> • Serial Neurological Exam • Rationale: Serial examinations define coma, brain injury, and prognosis • Response to verbal commands or physical stimulation • Pupillary light and corneal reflex, spontaneous eye movement • Gag, cough, spontaneous breaths • <u>EEG Monitoring if Comatose</u> • Rationale: Exclude seizures • Anticonvulsants if seizing • Core Temperature Measurement if Comatose • Rationale: Minimize brain injury and improve outcome • Prevent hyperpyrexia >37.7°C

Original article

The influence of rewarming after therapeutic hypothermia on outcome after cardiac arrest

- ◆ Resuscitation. 2012 Apr 18
- ◆ Bouwes A et. al
- ◆ Amsterdam, The Netherlands

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Rewarming rate

- ◆ Current consensus is to rewarm at 0.25-0.5°C/h and avoid fever
- ◆ Do these correlate with poor outcome ?
 - ◆ Active rewarming
 - ◆ The rate of rewarming
 - ◆ Development of fever

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Method

- ◆ Retrospective cohort study
- ◆ January 2006 to January 2009
- ◆ Rewarming :
 - ◆ Active rewarming: high rate ($\geq 0.5^\circ\text{C}/\text{h}$)
 - ◆ Normal rate ($< 0.5^\circ\text{C}/\text{h}$)
- ◆ Poor outcome
 - ◆ Death
 - ◆ Vegetative state
 - ◆ Severe disability after 6months

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Result

- ◆ 128 included patients, 56% had a poor outcome
- ◆ Actively rewarmed patients (38%) had a higher risk for poor outcome, OR 2.14 (1.01-4.57), $p < 0.05$, **BUT...**
- ◆ Adjustment for the confounders age and initial rhythm, OR 1.51 (0.64-3.58), no significance

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- ◆ A poor outcome was found in 15/21 patients (71%) with a high rewarming rate, compared to 54/103 patients (52%) with a normal rewarming rate, OR 2.61 (0.88-7.73), $p = 0.08$.
- ◆ Fever was not associated with outcome, OR 0.64 (0.31-1.30), $p = 0.22$

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Conclusion

- ◆ Active rewarming and the rewarming rate did not have a higher risk for a poor outcome

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Original article

Intra-arrest hypothermia during cardiac arrest : a systematic review

- ◆ Crit Care. 2012 Mar 7;16(2):R41
- ◆ Scolletta S et. al
- ◆ Brussels, Belgium

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Introduction

- ◆ When to start hypothermia when cardiac arrest ?
- ◆ As early as possible ??

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Methods

- ◆ Systematic search for intra-arrest therapeutic hypothermia (IATH)
- ◆ Outcomes related to the use of IATH
 - ◆ Mortality
 - ◆ Neurological status
 - ◆ Cardiac function
 - ◆ ROSC rate

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Results

- ◆ 23 animal studies and 5 human studies
- ◆ IATH improved survival and neurological outcomes when compared to normothermia and/or hypothermia after ROSC
- ◆ Improved ROSC rates and with improved cardiac function, including better left ventricular function, and reduced myocardial infarct size

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Conclusion

- ◆ IATH improves survival and neurological outcome when compared to normothermia and/or conventional hypothermia

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