Prognostic Significance of Tissue Oxygen Saturation Using Near Infrared Spectroscopy in Patients Undergoing Therapeutic Hypothermia After Cardiac Arrest

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BACKGROUND

- Tissue hemoglobin oxygen saturation (StO2) obtained non-invasively via near-infrared spectroscopy placed at the thenar eminence has been used as a surrogate marker of cardiac output and tissue oxygen delivery in critically ill patients.
- StO2 reading of 70-90 % indicates adequate cardiac perfusion and tissue oxygen delivery and a value < 70 % has been associated with poor prognosis in various conditions.
- There are no studies to date evaluating the prognostic significance of StO2 in patients undergoing therapeutic hypothermia after a cardiac arrest.

OBJECTIVE

- **Primary objective:**
  - To determine whether an initial StO2 ≥ 70 % recording has prognostic significance for survival to hospital discharge.
- **Secondary objective:**
  - To assess if an upward trend in StO2 within the first 24 hours,in a subgroup of patients with a presenting StO2 < 70 %, has prognostic significance for survival to hospital discharge.

DISCLOSURES

None.

RESULTS

Clinical Characteristics

Characteristics	N (%)
Age	61.74 ± 15.28 years
Male	85 (53%)
Hypertension	111(69%)
Diabetes Mellitus	55 (34 %)
Hyperlipidemia	96 (60%)
Congestive Heart Failure	52 (33 %)
Peripheral Arterial Disease	25 (16%)
COPD	34 (21%)
Coronary Artery Disease	79(49%)
CABG	42 (26%)
Chronic Kidney Disease	30(19%)
Cerebrovascular Accident	11 (7%)
Initial StO2 ≥ 70%	131 (82%)

COPD= chronic obstructive pulmonary disease, CABG= coronary artery bypass graft.

- Among 160 patients, 18% (n=29) survived with a CPC ≤2.

Multivariable Analysis

Covariate	OR	95% CI	P Value
Witnessed Cardiac Arrest	11.6	1.1-118.0	0.04
Shockable Rhythm	3.4	1.2-9.3	0.02
Time to ROSC ≤ 15 minutes	4.5	1.2-16.6	0.02
Age <65 years	7.6	2.3-25.5	0.001
Initial StO2 ≥ 70%	0.82	0.29-2.27	0.70

ROSC= return of spontaneous circulation, StO2 =tissue hemoglobin oxygen saturation.

- For patients with an initial StO2 <70%, there was no difference in outcome between those with an upward trend vs downward trend in StO2 (p=0.98).

METHODS

- Retrospective study of a 160 patients who underwent therapeutic hypothermia between August 2005 and June 2013.
- **Inclusion criteria:**
  - Time from arrest to ROSC < 60 minutes
  - Ages 18-80 years old
  - Comatose after ROSC defined as no purposeful movement or response
  - SBP > 90 mmHg with or without pressor support
- **Exclusion criteria:**
  - Pregnancy
  - Hypotension (SBP <90 or MAP <60 mmHg despite vasopressors)
  - Hypoxia (aO2 sat <85% for 15 minutes post-ROSC)
- StO2 data was collected at the initiation of therapeutic hypothermia and hourly thereafter till re-warming per protocol.
- Cerebral performance category(CPC) was used to assess neurological outcome at the time of hospital discharge; a score of ≤2 was defined as good neurological outcome.
- Univariate and multivariable analysis were performed.

CONCLUSIONS

- StO2 levels recorded from the thenar eminence were not associated with neurologic outcome.
- Witnessed cardiac arrest, shockable rhythm, time to return of spontaneous circulation < 15 minutes and age < 65 years were associated with a good neurological outcome.