End-Tidal CO2 monitoring to guide treatment during cardiac arrest

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Introduction

• Cardiac arrest is a common presentation to the emergency care system.

• The decision to terminate cardiopulmonary resuscitation (CPR) is often challenging to healthcare providers “there is no Criteria”

Introduction cont’

• factors that influence survival chance including:
  – the patient pre-morbid physiological reserves,
  – the circumstances of the cardiac arrest,
  – the length of the resuscitation efforts,
  – various bedside investigations such as:
    • blood gas analysis,
    • lactate levels
    • the results of echocardiography

Predictor & Capnography

- predictor unfortunately does not exist and decisions to discontinue resuscitation efforts are heavily dependent on subjective clinical assessment and judgement.

- The utility of capnography during cardiac arrest has been the centre of multiple studies in recent years. Capnography involves continuous monitoring of the partial pressure of the end tidal carbon dioxide (ETCO2).

ETCO2

- ETCO2 has therefore been used to reflect the efficacy of chest compressions during CPR and as an early indicator of return of spontaneous circulation (ROSC)

Main questions

• Does ETCO2 have prognostic value during cardiac arrest?
• Can the possible prognostic value of ETCO2 be used to facilitate decision making regarding the termination of CPR?

Evidence

• There is a growing body of evidence to suggest a relationship between ETCO2 values and the outcome of cardiopulmonary resuscitation. Several studies have shown that CPR ETCO2 measurements were significantly higher in patients who later developed ROSC compared to patients who did not and for patients who survived to hospital discharge compared to patients who did not.


The ability of ETCO2 in prediction

- For predicting ROSC, initial ETCO2 cut-off value of 1.33 kPa has been shown to have a sensitivity of 100% in three large pre-hospital studies.

- BUT

- initial ETCO2 value of less than 1.33 kPa appears to be a strong predictor of mortality.

Limitations of studies

- none of the studies reported the 95% confidence interval of the estimated 100% sensitivity to establish its precision.

- Furthermore, all these studies were done in pre-hospital settings, limiting the generalisability of such results to cover intra-hospital cardiac arrests or cardiac arrests arriving into the ED.
Conclusion

• There is growing evidence in the literature demonstrating a correlation between ETCO2 values during CPR and the outcome of resuscitation, and therefore, ETCO2 values appears to be prognostic for short term outcome.

• BUT

• the ability of ETCO2 cut-off values to reliably predict the outcome of resuscitation with high accuracy is not established
Conclusion

• ETCO2 values during cardiac arrest are potentially a better predictor of mortality as opposed to a predictor of survival due to the relative high sensitivity for ETCO2 cut-off values to predict ROSC and short term survival.