Acute Cardiovascular Care

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Erschaffen Sie sich Ihre ertragreiche grüne Oase in Ihrem Zuhause oder in Ihrer Praxis

Mehr als nur eine Dekoration:

- Sie wollen das Besondere?
- Sie möchten Ihre eigenen Salate, Kräuter und auch Ihr Gemüse ernten?
- Frisch, reif, ungespritzt und voller Geschmack?
- Ohne Vorkenntnisse und ganz ohne grünen Daumen?

Dann sind Sie hier richtig
The benefit from prehospital cooling in cardiac arrest is still without final answers.

Since 2002, therapeutic hypothermia has been implemented around the world in the treatment of cardiac arrest victims. Two studies, of which one was based in the prehospital setting [1, 2], demonstrated that survival was better if a cardiac arrest patient was cooled after the return of spontaneous circulation (ROSC). In 2008, Kimäräinen et al published the first study to examine the possible approach of cooling during the cardiac arrest, before ROSC [3], and this remains a topic of great interest to this day.

Last year at the AHA meeting in Dallas, Texas, an interesting study was presented by Francis Kim and his colleagues in Seattle, that was published in JAMA on the same day. The aim was to study standard care of cardiac arrest victims with or without prehospital cooling with an infusion of upto 2 litres of 4 °C cold saline after ROSC.

Seattle EMS has one of the best systems in the world with very high survival rates. The study thus had a very good grounding in an effective system with a good research culture. The protocol allowed the receiving hospital to treat the patient with their own protocols and decisions made by the treating physician. Analyses were performed separately for patients in ventricular fibrillation and patients in other initial rhythms. The primary analysis included 1359 patients of which 688 were randomised to prehospital cooling with cold saline. Of these 688, not all received cold saline, with 4% of the VF group and 7% of the non shockable rhythm group not receiving the treatment despite being randomised to that arm. Less than 50% of those patients received the full 2 l of saline. Those given it were cooled to 34 degrees more than one hour faster than the control group and the temperature was approx. 1.2 degrees lower when the cooled patients arrived at the hospital.Importantly, only 77% of all patients enrolled into the study received cooling in the hospital.

The authors concluded that there was no overall survival benefit, nor improvement in neurological outcome in the patients cooled after ROSC in the field by using cold saline.

However, multiple factors influencing the survival after a cardiac arrest were not mentioned in the article including the quality of the CPR delivered.

One detail missing in all studies currently reporting neurological outcome after cardiac arrest, is the improvement of CPC (cerebral performance category) as compared to the patients baseline prior to the cardiac arrest. When CPC is reported authors only give the category the patients have on assessment after the cardiac arrest without taking into account that not all of the patients might have been in CPC 1 when they arrested.

There are some unpublished data from Dr Tiainen and the Helsinki group showing that in a cohort of 57 patients, two with a final CPC 2 were CPC 2 already before the arrest and out of three patients assessed as CPC 3 after their arrest, two were CPC 2 before the arrest and one was CPC 3. Therefore outcome improvement can only be fully appreciated once a clear picture is obtained of the functional status of the patient before their cardiac arrest.

Looking at some of the multiple studies examining prehospital cooling using cold saline as a hypothermia induction method in the immediate post resuscitation phase, including studies from the authors of one of the landmark trials from 2002 [1, 2] there appears to be no benefit in outcome despite an actual reduction in temperature prior to hospital arrival (REF). Kim has again shown this, but also with a report of possible harm to the patient (through re-arrest rate and levels of pulmonary oedema).

It is a concern that the authors state though that prehospital cooling is of no benefit. This is incorrect and one can wonder how a prominent paper like JAMA has not demanded a more precise statement of what the research question of this study actually was. Specifically, does post-ROSC cooling using cold saline improve outcome from cardiac arrest?

We know from animal studies that there is a significant difference in the results from cooling when different methods are used. For example one study [4] demonstrated a difference of 63% in survival between the use of cold saline when compared to the total liquid ventilation method, while another [5] showed the use of trans nasal evaporative cooling resulted in 100% successful resuscitation in a swine model of cardiac arrest, compared with only 29% when cold saline was used. It is also shown in many studies that volume loading quickly...
after ROSC is not beneficial as volume loading gives a rise in right atrial pressure with coronary artery pressure remaining unchanged. This leads to coronary and cerebral perfusion pressure decreasing.

There are also two very different periods in resuscitation in the prehospital setting: the intra-arrest period and the post-arrest period. The study by Kim et al is looking only at the later. There has been one randomised control study on intra-arrest cooling with trans nasal evaporative cooling which showed strong trends towards benefit, but as this study was not powered for outcome, limited conclusions can be drawn [6]. Cooling during arrest may provide some protection from the ischemic event as well as preventing or reducing the development of the reperfusion injury we know take place after ROSC.

In conclusion, Kim et al has led an interesting study investigating one cooling method, cold saline, in the post-arrest period. Reviewing the data, we can conclude that this method does not provide benefit to the outcome of the cardiac arrest patient. There are other methods available for the induction of pre-hospital moderate therapeutic hypothermia and other time points in the resuscitation (during CPR) to target the start of cooling, that still may further improve survival and neurological function for those suffering from cardiac arrest.

The resuscitation community needs to keep an open mind and not jump to an incorrect assumption on prehospital cooling based on Kim’s study. Even the author himself, states in a video interview taken during the AHA conference in November last year, that other methods may be beneficial [7].

We continue enrolment into the PRINCESS study [8] looking at survival from cardiac arrest when using intra-arrest-trans-nasal evaporative cooling, and eagerly await the conclusion. Over 300 patients are included and we will have some important results in due time. Let the evidence guide us and let us not be too fast in drawing conclusions when the current evidence is lacking.

References:

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