

COMPRESSIONS TORÀCIQUES

El LUCAS trenca més costelles (probablement perquè fa millors compressions), no trenca més esternons ni provoca cap lesió mortal.

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CPR-related injuries after manual or mechanical chest compressions with the LUCAS™ device. A multicentre study of victims after unsuccessful resuscitation.

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Abstract

AIM: The reported incidence of injuries due to cardiopulmonary resuscitation using manual chest compressions (manual CPR) varies greatly. Our aim was to elucidate the incidence of CPR-related injuries by manual chest compressions compared to mechanical chest compressions with the LUCAS device (mechanical CPR) in non-survivors after out-of-hospital cardiac arrest.

METHODS: In this prospective multicentre trial, including 222 patients (83 manual CPR/139 mechanical CPR), autopsies were conducted after unsuccessful CPR and the results were evaluated according to a specified protocol.

RESULTS: Among the patients included, 75.9% in the manual CPR group and 91.4% in the mechanical CPR group ($p=0.002$) displayed CPR-related injuries. Sternal fractures were present in 54.2% of the patients in the manual CPR group and in 58.3% in the mechanical CPR group ($p=0.56$). Of the patients in the manual CPR group, there were 64.6% with at least one rib fracture versus 78.8% in the mechanical CPR group ($p=0.02$). The median number of rib fractures among patients with rib fractures was 7 in the manual CPR group and 6 in the mechanical CPR group. No CPR-related injury was considered to be the cause of death.

CONCLUSION: In patients with unsuccessful CPR after out-of-hospital cardiac arrest, rib fractures were more frequent after mechanical CPR but there was no difference in the incidence of sternal fractures. No injury was deemed fatal by the pathologist.

El “comprime tan rápido como puedas” fa que la qualitat de les compressions sigui pitjor

Am J Emerg Med. 2014 Sep 6. pii: S0735-6757(14)00650-0. doi: 10.1016/j.ajem.2014.08.074. [Epub ahead of print]

Push-fast recommendation on performing cardiopulmonary resuscitation causes excessive chest compression rates, a manikin model.

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Abstract

BACKGROUND: Increasing chest compression rate during cardiopulmonary resuscitation can affect the workload and, ultimately, the quality of chest compression. This study examines the effects of compression at the rate of as-fast-as-you-can on cardiopulmonary resuscitation (CPR) performance.

METHODS: A crossover, randomized-to-order design was used. Each participant performed chest compressions without ventilation on a manikin with 2 compression rates: 100 per minute (100-cpm) and "push as-fast-as you-can" (PF). The participants performed chest compressions at a rate of either 100-cpm or PF and subsequently switched to the other after a 50-minute rest.

RESULTS: Forty-two CPR-qualified nonprofessionals voluntarily participated in the study. During the PF session, the rescuers performed CPR with higher compression rates (156.8 vs 101.6 cpm), more compressions (787.2 vs 510.8 per 5 minutes), and more duty cycles (51.0% vs 41.7%), but a lower percentage of effective compressions (47.7% vs 57.9%) and a lower compression depth (35.6 vs 38.0 mm) than they did during the 100-cpm session. The CPR quality deteriorated in numbers and percentile of effective compression since the third minute in the PF session and the fourth minute in the 100-cpm session. The percentile of compressions with adequate depth in the 100-cpm sessions was higher than that in the PF sessions during the second, third, and fourth minutes of CPR.

CONCLUSION: Push-fast technique showed a significant decrease in the percentile of effective chest compression compared with the 100-cpm technique during the 5-minute hand-only CPR. The PF technique exhibited a trend toward increased fatigue in the rescuers, which can result in early decay of CPR quality.

DESFIBRIL·LACIÓ

Sobre el desplegament dels DEAs a Dinamarca. No he aconseguit l'article

Circulation. 2014 Oct 1. pii: CIRCULATIONAHA.114.008850. [Epub ahead of print]

Temporal Trends in Coverage of Historical Cardiac Arrests Using a Volunteer-Based Network of Automated External Defibrillators Accessible to Laypersons and Emergency Dispatch Centers.

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Abstract

BACKGROUND: Although increased dissemination of Automated External Defibrillators (AEDs) has been associated with more frequent AED use, the trade-off between the number of deployed AEDs and coverage of cardiac arrests remains unclear. We investigated how volunteer-based AED dissemination affected public cardiac arrest coverage in high- and low-risk areas.

METHODS AND RESULTS: All public cardiac arrests (1994-2011) and all registered AEDs (2007-2011) in Copenhagen, Denmark, were identified and geocoded. AED coverage of cardiac arrests was defined as historical arrests ≤ 100 meters from an AED. High-risk areas were defined as those with ≥ 1 arrest every 2 years and accounted for 1.0% of the total city area. Of 1864 cardiac arrests, 18.0% (n=335) occurred in high-risk areas throughout the study period. From 2007-2011, the number of AEDs and the corresponding coverage of cardiac arrests increased from 36 to 552 and from 2.7% to 32.6%, respectively. The corresponding increase for high-risk areas was from 1 to 30 AEDs and coverage from 5.7% to 51.3%, respectively. Since the AED network establishment (2007-2011) few arrests (n=55) occurred ≤ 100 meters of an AED with only 14.5% (n=8) being defibrillated before EMS arrival.

CONCLUSIONS: Despite the lack of a coordinated public access defibrillation program, the number of AEDs increased 15-fold with a corresponding increase in cardiac arrest coverage from 2.7% to 32.6% over a 5-year period. The highest increase in coverage was observed in high-risk areas (from 5.7% to 51.3%). AED networks can be used as useful tools to optimize AED placement in community settings.

PEDIATRIA

Hipotèrmia en pediatria

Pediatr Crit Care Med. 2014 Sep 29. [Epub ahead of print]

Efficacy Outcome Selection in the Therapeutic Hypothermia After Pediatric Cardiac Arrest Trials.

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Abstract

OBJECTIVES: The Therapeutic Hypothermia After Pediatric Cardiac Arrest trials will determine whether therapeutic hypothermia improves survival with good neurobehavioral outcome, as assessed by the Vineland Adaptive Behavior Scales Second Edition, in children resuscitated after cardiac arrest in the in-hospital and out-of-hospital settings. We describe the innovative efficacy outcome selection process during Therapeutic Hypothermia After Pediatric Cardiac Arrest protocol development.

DESIGN/SETTING: Consensus assessment of potential outcomes and evaluation timepoints.

INTERVENTIONS: None.

MEASUREMENTS AND MAIN RESULTS: We evaluated practical and technical advantages of several follow-up timepoints and continuous/categorical outcome variants. Simulations estimated power assuming varying hypothermia benefit on mortality and on neurobehavioral function among survivors. Twelve months after arrest was selected as the optimal assessment timepoint for pragmatic and clinical reasons. Change in Vineland Adaptive Behavior Scales Second Edition from prearrest level, measured as quasicontinuous with death and vegetative status being worst-possible levels, yielded optimal statistical power. However, clinicians preferred simpler multicategorical or binary outcomes because of easier interpretability and

avored outcomes based solely on postarrest status because of concerns about accurate parental assessment of prearrest status and differing clinical impact of a given Vineland Adaptive Behavior Scales Second Edition change depending on prearrest status. Simulations found only modest power loss from categorizing or dichotomizing quasicontinuous outcomes because of high expected mortality. The primary outcome selected was survival with 12-month Vineland Adaptive Behavior Scales Second Edition no less than two SD below a reference population mean (70 points), necessarily evaluated only among children with prearrest Vineland Adaptive Behavior Scales Second Edition greater than or equal to 70. Two secondary efficacy outcomes, 12-month survival and quasicontinuous Vineland Adaptive Behavior Scales Second Edition change from prearrest level, will be evaluated among all randomized children, including those with compromised function prearrest.

CONCLUSIONS: Extensive discussion of optimal efficacy assessment timing, and of the advantages versus drawbacks of incorporating prearrest status and using quasicontinuous versus simpler outcomes, was highly beneficial to the final Therapeutic Hypothermia After Pediatric Cardiac Arrest design. A relatively simple, binary primary outcome evaluated at 12 months was selected, with two secondary outcomes that address the potential disadvantages of primary outcome.

HIPOTÈRMIA

Una nova manera de fer hipotèrmia amb una mena de combitube amb una infusió de salí a 5°C

Resuscitation. 2014 Sep 28. pii: S0300-9572(14)00756-4. doi: 10.1016/j.resuscitation.2014.09.014. [Epub ahead of print]

Feasibility study of immediate pharyngeal cooling initiation in cardiac arrest patients after arrival at the emergency room.

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Abstract

AIM: Cooling the pharynx and upper oesophagus would be more advantageous for rapid induction of therapeutic hypothermia since the carotid arteries run in their vicinity. The aim of this study was to determine the effects of pharyngeal cooling on brain temperature and the safety and feasibility for patients under resuscitation.

METHODS: Witnessed non-traumatic cardiac arrest patients (n=108) were randomized to receive standard care with (n=53) or without pharyngeal cooling (n=55). In the emergency room, pharyngeal cooling was initiated before or shortly after return of spontaneous circulation by perfusing physiological saline (5°C) into a pharyngeal cuff for 120min.

RESULTS: There was a significant decrease in tympanic temperature at 40min after arrival (P=0.02) with a maximum difference between the groups at 120min (32.9±1.2°C, pharyngeal cooling group vs. 34.1±1.3°C, control group; P<0.001). The return of spontaneous circulation (70% vs. 65%, P=0.63) and rearrest (38% vs. 47%, P=0.45) rates were not significantly different based on the initiation of pharyngeal cooling. No post-treatment mechanical or cold-related injury was observed on the pharyngeal epithelium by macroscopic observation. The thrombocytopaenia incidence was lower in the pharyngeal cooling group (P=0.001) during the 3-day period after arrival. The cumulative survival rate at 1 month was not significantly different between the two groups

CONCLUSIONS: Initiation of pharyngeal cooling before or immediately after the return of spontaneous circulation is safe and feasible. Pharyngeal cooling can rapidly decrease tympanic temperature without adverse effects on circulation or the pharyngeal epithelium.

Sobre l'hemodinàmica a 33°C vs 36°C. Tampoc hi ha l'article ☺

Circ Cardiovasc Interv. 2014 Sep 30. pii: CIRCINTERVENTIONS.114.001556. [Epub ahead of print]

Targeted Temperature Management at 33°C Versus 36°C and Impact on Systemic Vascular Resistance and Myocardial Function After Out-of-Hospital Cardiac Arrest: A Sub-Study of the Target Temperature Management Trial.

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Abstract

BACKGROUND: Cardiovascular dysfunction is common after out-of-hospital cardiac arrest as part of the postcardiac arrest syndrome, and hypothermia may pose additional impact on hemodynamics. The aim was to investigate systemic vascular resistance index (SVRI), cardiac index, and myocardial performance at a targeted temperature management of 33°C (TTM33) versus 36°C (TTM36).

METHODS AND RESULTS: Single-center substudy of 171 patients included in the Target Temperature Management Trial (TTM Trial) randomly assigned to TTM33 or TTM36 for 24 hours after out-of-hospital cardiac arrest. Mean arterial pressure ≥ 65 mm Hg and central venous pressure of 10 to 15 mm Hg were hemodynamic treatment goals. Hemodynamic evaluation was performed by serial right heart catheterization and transthoracic echocardiography. Primary end point was SVRI after 24 hours of cooling and secondary end points included mean SVRI, cardiac index, systolic function, and lactate levels. The TTM33 group had a significant increase in SVRI compared with TTM36 (2595; 95% confidence interval, 2422-2767) versus 1960 (95% confidence interval, 1787-2134) dynes m²/s per cm⁵; $P < 0.0001$, respectively) after 24 hours of cooling with an overall difference of 556 dynes m²/s per cm⁵ ($P_{\text{group}} < 0.0001$). TTM33 was associated with decreased cardiac index (-0.4 L/min per m²; $P_{\text{group}} < 0.0001$), decreased heart rate ($P_{\text{group}} = 0.01$), and stroke volume index ($P_{\text{group}} = 0.004$) compared with TTM36. Left ventricular ejection fraction ($P = 0.39$) and peak systolic myocardial velocity ($P = 0.62$) did not differ between TTM groups. Lactate levels were significantly higher in the TTM33 group ($P = 0.0008$).

CONCLUSIONS: Targeted temperature management at 33°C with target mean arterial pressure ≥ 65 mm Hg is associated with increased SVRI and lower cardiac index because of lower heart rate with unaffected left ventricular systolic function compared with 36°C.

PRONÒSTIC

Un nou marcador de mal pronòstic, que no sembla millorar l'evolució

Resuscitation. 2014 Sep 28. pii: S0300-9572(14)00748-5. doi: 10.1016/j.resuscitation.2014.09.007. [Epub ahead of print]

Post-cardiac arrest serum levels of glial fibrillary acidic protein for predicting neurological outcome.

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Abstract

AIM OF THE STUDY: To investigate serum levels of glial fibrillary acidic protein (GFAP) for evaluation of neurological outcome in cardiac arrest (CA) patients and compare GFAP sensitivity and specificity to that of more studied biomarkers neuron-specific enolase (NSE) and S100B.

METHOD: A prospective observational study was performed in three hospitals in Sweden during 2008-2012. The participants were 125 CA patients treated with therapeutic hypothermia (TH) to 32-34°C for 24 hours. Samples were collected from peripheral blood (n=125) and the jugular bulb (n=47) up to 108 hours post-CA. GFAP serum levels were quantified using a novel, fully automated immunochemical method. Other biomarkers investigated were NSE and S100B. Neurological outcome was assessed using the Cerebral Performance Categories scale (CPC) and dichotomized into good and poor outcome.

RESULTS: GFAP predicted poor neurological outcome with 100% specificity and 14-23% sensitivity at 24, 48 and 72 hours post-CA. The corresponding values for NSE were 27-50% sensitivity and for S100B 21-30% sensitivity when specificity was set to 100%. A logistic regression with stepwise combination of the investigated biomarkers, GFAP, did not increase the ability to predict neurological outcome. No differences were found in GFAP, NSE and S100B levels when peripheral and jugular bulb blood samples were compared.

CONCLUSION: Serum GFAP was increased in patients with poor outcome but did not show sufficient sensitivity to predict neurological outcome after CA. Both NSE and S100B were shown to be better predictors. The ability to predict neurological outcome did not increase when combining the three biomarkers.

El BIS post ROSC, pot ser un marcador de pronòstic als 6 mesos

Resuscitation. 2014 Sep 23. pii: S0300-9572(14)00750-3. doi: 10.1016/j.resuscitation.2014.09.009. [Epub ahead of print]

Bispectral Index to Predict Neurological Outcome Early After Cardiac Arrest.

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Abstract

AIM OF THE STUDY: To address the value of continuous monitoring of bispectral index (BIS) to predict neurological outcome after cardiac arrest.

METHODS: In this prospective observational study in adult comatose patients treated by therapeutic hypothermia after cardiac arrest we measured bispectral index (BIS) during the first 24 hours of intensive care unit stay. A blinded neurological outcome assessment by cerebral performance category (CPC) was done 6 months after cardiac arrest.

RESULTS: Forty-six patients (48%) had a good neurological outcome at 6-month, as defined by a cerebral performance category (CPC) 1-2, and 50 patients (52%) had a poor neurological outcome (CPC 3-5). Over the 24h of monitoring, mean BIS values over time were higher in the good outcome group (38±9) compared to the poor outcome group (17±12) (p<0.001). Analysis of BIS recorded every 30 minutes provided an optimal prediction after 12.5h, with an area under the receiver operating characteristic curve (AUC) of 0.89, a specificity of 89% and a sensitivity of 86% using a cut-off value of 23. With a specificity fixed at 100% (sensitivity 26%)

the cut-off BIS value was 2.4 over the first 271minutes. In multivariable analyses including clinical characteristics, mean BIS value over the first 12.5h was a predictor of neurological outcome ($p=6E-6$) and provided a continuous net reclassification index of 1.28% ($p=4E-10$) and an integrated discrimination improvement of 0.31 ($p=1E-10$).

CONCLUSIONS: Mean BIS value calculated over the first 12.5h after ICU admission potentially predicts 6-months neurological outcome after cardiac arrest.

REVISIONS

Sembla una obvietat, però bo és saber-ho amb dades. Tampoc he aconseguit l'article. No estic fi, deu ser el jet-lag.

Crit Care. 2014 Sep 22;18(5):528. [Epub ahead of print]

Prognostic implications of conversion from non-shockable to shockable rhythms in out-of-hospital cardiac arrest.

Goto Y, Maeda T, Nakatsu-Goto Y.

Abstract

Introduction: The prognostic significance of conversion from non-shockable to shockable rhythms in patients with initial non-shockable rhythms who experience out-of-hospital cardiac arrest (OHCA) remains unclear. We hypothesized that the neurological outcomes in those patients would improve with subsequent shock delivery following conversion to shockable rhythms, and that the time from initiation of cardiopulmonary resuscitation by emergency medical services personnel to the first defibrillation (shock delivery time) would influence those outcomes.

Methods: We analyzed the data of 569,937 OHCA adults with initial non-shockable rhythms; the data were collected in a nationwide Utstein-style Japanese database between 2005 and 2010. Patients were divided into subsequently shocked ($n=21,944$) and subsequently not-shocked ($n=547,993$) cohorts. The primary study end point was 1-month favorable neurological outcome (cerebral performance category scale, category 1 or 2).

Results: In the subsequently shocked cohort, the ratio of 1-month favorable neurological outcome was significantly higher than that in the subsequently not-shocked cohort (1.79% versus 0.60%, $P < 0.001$). Multivariate logistic regression analysis for 11 prehospital variables revealed that when the shock delivery time was less than 20 minutes, subsequent shock delivery was significantly associated with increased odds of 1-month favorable neurological outcomes (adjusted odds ratio (95% confidence interval), 6.55 (5.21 to 8.22) and 2.97 (2.58 to 3.43); for shock delivery times less than 10 minutes and 10 to 19 minutes, respectively). However, when the shock delivery time was more than or equal to 20 minutes, subsequent shock delivery was not associated with increased odds of 1-month favorable neurological outcomes.

Conclusions: In patients with an initial non-shockable rhythm after OHCA, subsequent conversion to shockable rhythms during emergency medical services resuscitation efforts was associated with increased odds of 1-month favorable neurological outcomes when the shock delivery time was less than 20 min.

ESTUDIOS EXPERIMENTALES

Un nou article del meu amic Theodoros

Am J Emerg Med. 2014 Aug;32(8):871-7. doi: 10.1016/j.ajem.2014.04.036. Epub 2014 Apr 26.

Erythropoietin administration facilitates return of spontaneous circulation and improves survival in a pig model of cardiac arrest.

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Abstract

BACKGROUND: In addition to its role in the endogenous control of erythropoiesis, recombinant human erythropoietin (rh-EPO) has been shown to exert tissue protective properties in various experimental models. However, its role in the cardiac arrest (CA) setting has not yet been adequately investigated.

AIM: The aim of this study is to examine the effect of rh-EPO in a pig model of ventricular fibrillation (VF)-induced CA.

METHODS: Ventricular fibrillation was electrically induced in 20 piglets and maintained untreated for 8 minutes before attempting resuscitation. Animals were randomized to receive rh-EPO (5000 IU/kg, erythropoietin [EPO] group, n = 10) immediately before the initiation of chest compressions or to receive 0.9% Sodium chloride solution instead (control group, n = 10).

RESULTS: Compared with the control, the EPO group had higher rates of return of spontaneous circulation (ROSC) (100% vs 60%, P = .011) and higher 48-hour survival (100% vs 40%, P = .001). Diastolic aortic pressure and coronary perfusion pressure during cardiopulmonary resuscitation were significantly higher in the EPO group compared with the control group. Erythropoietin-treated animals required fewer number of shocks in comparison with animals that received normal saline (P = .04). Furthermore, the neurologic alertness score was higher in the EPO group compared with that of the control group at 24 (P = .004) and 48 hours (P = .021).

CONCLUSION: Administration of rh-EPO in a pig model of VF-induced CA just before reperfusion facilitates ROSC and improves survival rates as well as hemodynamic variables.

COMUNICACIÓ DURANT LA RCP

Hem d'aprendre molt de l'aviació.

Resuscitation <http://dx.doi.org/10.1016/j.resuscitation.2014.08.034>

Communication during resuscitation: Time for a change?

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