RCP/COMPRESSORS TORÀCICS MECÀNICS

1. High Alt Med Biol. 2019 Dec 19. doi: 10.1089/ham.2019.0047. [Epub ahead of print]
Evaluation of the Quality of Manual, Compression-Only CardioPulmonary Resuscitation in a Moving Ski Patrol Toboggan.
Abrams T(1)(2), Torfason L(3)(4).
Abstract
INTRODUCTION: CardioPulmonary Resuscitation (CPR) quality may be impacted by location and setting of an out of hospital cardiac arrest. This study compared the quality of CPR performed on a moving ski patrol toboggan versus stationary CPR, both performed outdoors in winter. MATERIALS AND METHODS: Compression-only CPR was performed on a manikin attached to a backboard secured into a toboggan. A CPR device was used to measure compression rate, depth and recoil, and elapsed time. A convenience sample of 30 patrollers, in weather-appropriate clothing, participated in this nonrandomized, crossover study. Each first performed 5 continuous sets of 30 compressions of stationary CPR straddling the manikin while kneeling. After 15 minutes rest, participants performed CPR while moving down the designated ski run (fixed length, vertical drop, and slope angles). Each ski run was video captured with a GoPro camera. Quality was defined as compliance with 2015 International Liaison Committee on Resuscitation (ILCOR) guidelines for CPR. RESULTS: Overall, stationary and moving chest compressions complied with ILCOR guidelines, but there was statistically significant degradation of CPR quality while moving and over time. Fewer compressions met ILCOR guidelines in comparison to stationary CPR compressions: (1) stationary mean depth 87% compliant, moving mean depth 35% compliant, 95% confidence interval: 39-65 ($p < 0.001$); (2) stationary mean rate 90% while moving mean rate 64% compliant; and (3) stationary recoil 74%, while moving recoil 77% compliant. Noncompliant compressions were typically too shallow, and noncompliance for rate was typically too fast. There were no pauses over 10 seconds once compressions were started. CONCLUSIONS: Despite CPR quality being reduced while moving, there were sufficient compliant compressions to support the use of CPR in this setting. Maintaining regular CPR training in a working environment and optimal body position in relation to the patient may be keys to performing high quality CPR on a moving toboggan.

REGISTRES, REVISIONS I EDITORIALS

1. Br J Anaesth. 2019 Dec 10. pii: S0007-0912(19)30877-3. doi:10.1016/j.bja.2019.11.005. [Epub ahead of print]
Why chest compressions should start when systolic arterial blood pressure is below 50 mm Hg in the anaesthetised patient.
Harper NJN(1), Nolan JP(2), Soar J(3), Cook TM(4).
NO ABSTRACT AVAILABLE

2. J Clin Ethics. 2019 Winter;30(4):347-355.
Family Presence During Cardiopulmonary Resuscitation.
Lederman Z(1).
Abstract
Most professional guidelines advocate family presence during resuscitation (FPDR). Many clinicians, however, are still reluctant to implement this recommendation. In this article I present the most comprehensive case for FPDR to date. I review the little that has been written about the ethics of FPDR, as well as the available empirical evidence. More importantly, I present and defend three arguments

for FPDR: adherence to professional guidelines, benefit to patients and relatives, and patients' autonomy. I conclude with suggestions for future research.

3. N Engl J Med. 2019 Dec 5;381(23):2242-2251. doi: 10.1056/NEJMra1802529.
Lay Responder Care for an Adult with Out-of-Hospital Cardiac Arrest.
Brady WJ(1), Mattu A(1), Slovis CM(1).
NO ABSTRACT AVAILABLE

4. Resuscitation. 2019 Dec 14;147:1-11. doi: 10.1016/j.resuscitation.2019.12.003.[Epub ahead of print]
Adult post-cardiac arrest interventions: An overview of randomized clinical trials.
Andersen LW(1), Lind PC(2), Vammen L(3), Høybye M(4), Holmberg MJ(5), Granfeldt A(6).
Abstract
AIM: To provide an overview of published and registered trials related to post-cardiac arrest interventions. DATA SOURCE: We searched PubMed and the International Clinical Trials Registry Platform for randomized clinical trials in adults specifically addressing a post-cardiac arrest intervention. RESULTS: We identified 65 manuscripts reporting randomized clinical trials. The majority of the trials were published within the last 10 years and the sample sizes were generally low with a median of 90 participants (quartiles: 49, 262; range: 9, 1359). The majority of the trials were conducted in out-of-hospital cardiac arrest (79%), while only 6% were conducted specifically in in-hospital cardiac arrest and 15% included both in- and out-of-hospital cardiac arrest. We identified 48 registered trials online. The median target sample size is 100 participants (quartiles: 60, 400; range: 20, 1900). The majority of trials are enrolling patients with out-of-hospital cardiac arrest (71%) while 6% specifically focuses on in-hospital cardiac arrest. CONCLUSION: This review provides an overview of published and registered trials addressing post-cardiac arrest interventions. We believe this information will be relevant to guide future research.

ACR INTRAHOSPITALÀRIA

1. Am J Emerg Med. 2019 Dec 14. pii: S0735-6757(19)30831-9. doi:10.1016/j.ajem.2019.12.025. [Epub ahead of print]
An outcome study of adult in-hospital cardiac arrests in non-monitored areas with resuscitation attempted using AED.
Moriwaki K(1), Watanabe T(2), Yasuda M(3), Katagiri T(4), Ueki M(5), Kurita S(6), Sanuki M(7), Tsutsumi YM(8).
Abstract
OBJECTIVES: To investigate the outcomes of patients with in-hospital cardiac arrest (IHCA) who underwent cardiopulmonary resuscitation (CPR) using an automated external defibrillator (AED) in non-monitored areas. Additionally, to detect correlated factors associated with rate of return of spontaneous circulation (ROSC) and survival rate, among collected data. METHODS: This study included 109 patients. After investigating patient characteristics and resuscitation-related factors, the correlated factors associated with ROSC rates and survival rate were analyzed using univariate and multivariate analyses. RESULTS: The rate of survival to hospital discharge was 21.1%. CPR with AED performed since 2013 was associated with a higher ROSC rate (adjusted odds ratio [AOR] 3.24, 95% confidence interval [CI]: 1.21 to 9.52, $p < 0.05$), but not with the survival rate after ROSC. Tracheal intubation was significantly associated with a higher ROSC rate (AOR 3.62, 95% CI: 1.27 to 11.7, $p < 0.05$) and a lower survival rate after ROSC (hazard ratio 6.6, 95% CI: 1.2 to 43.3, $p < 0.05$). Dysrhythmia as the cause of cardiac arrest and intensive care unit (ICU) admission after ROSC were associated with higher survival rates (hazard ratio 0.056, 95% CI: 0.004 to 0.759, $p < 0.05$, and hazard ratio 0.072, 95% CI: 0.017 to 0.264, $p < 0.0001$, respectively). CONCLUSIONS: The factors associated with ROSC rate and those associated with the survival rate after ROSC were different. Although initial

shockable rhythms on AED were not associated with the survival rate, dysrhythmia as the etiology of cardiac arrest, and ICU admission were significantly associated with higher survival rates after ROSC.
FREE FULL TEXT

LESIONS PER RCP (Article del Youcef!)

1. Front Physiol. 2019 Dec 3;10:1475. doi: 10.3389/fphys.2019.01475. eCollection 2019.
Understanding the Adverse Hemodynamic Effects of Serious Thoracic Injuries During Cardiopulmonary Resuscitation: A Review and Approach Based on the Campbell Diagram.
Azeli Y(1)(2)(3), Lorente Olazabal JV(4)(5), Monge García MI(6), Bardají A(7)(8).
Abstract
Chest compressions during cardiopulmonary resuscitation (CPR) generate cardiac output during cardiac arrest. Their quality performance is key to achieving the return of spontaneous circulation. Serious thoracic injuries (STIs) are common during CPR, and they can change the shape and mechanics of the thorax. Little is known about their hemodynamic effects, so a review of this emerging concept is necessary. The Campbell diagram (CD) is a theoretical framework that integrates the lung and chest wall pressure-volume curves, allowing us to assess the consequences of STIs on respiratory mechanics and hemodynamics. STIs produce a decrease in the compliance of the chest wall and lung. The representation of STIs on the CD shows a decrease in the intrathoracic negative pressure and a functional residual capacity decrease during the thoracic decompression, leading to a venous return impairment. The thorax with STIs is more vulnerable to the adverse hemodynamic effects of leaning, hyperventilation, and left ventricular outflow tract obstruction during CPR. A better understanding of the effects of STIs during CPR, and the study of avoidable injuries, can help to improve the effectiveness of chest compressions and the survival in cardiac arrest.
FREE FULL TEXT

ETIOLOGIA DE L'ACR

1. Obes Surg. 2019 Dec 24. doi: 10.1007/s11695-019-04363-9. [Epub ahead of print]
Laparoscopic Sleeve Gastrectomy Carries a Lower Perioperative Mortality Including Sudden Cardiac Death over Roux-en-Y Gastric Bypass in Patients with a Prior Cardiac History: An MBSAQIP Analysis.
Foster MW(1)(2), Gershuni VM(3), Tewksbury CM(3), Giri JS(4)(5), Dumon KR(3), Rame JE(4), Williams NN(3).
Abstract
BACKGROUND: Although bariatric surgery has proven beneficial for those with cardiovascular disease (CVD), the overall and procedure-specific risk associated with bariatric surgery in this patient population remains unknown. DESIGN: Patients who underwent primary laparoscopic, laparoscopic-assisted, or robotic-assisted Roux-En-Y gastric bypass (RYGB) or sleeve gastrectomy (SG) at a MBSAQIP-accredited center were included (n = 494,611). Exposures include history of MI, PCI, or cardiac surgery who underwent RYGB or SG. Outcome measures were 30-day mortality, perioperative cardiac arrest, and rehospitalization. RESULTS: Of 494,611 patients enrolled in MBSAQIP, 15,923 had a history of MI, PCI, or cardiac surgery (prior cardiac history). Patient history of MI, PCI, and cardiac surgery was associated with significantly increased adjusted risk of perioperative cardiac arrest requiring CPR (OR: 2.31, 2.12, 2.42, respectively) and adjusted 30-day mortality (OR: 1.72, 1.50, 1.68, respectively). Prior cardiac history was associated with increased adjusted 30-day readmission rate (MI - OR, 1.42; PCI - OR, 1.45; and cardiac surgery - OR, 1.68). Further, 30-day postoperative readmission, postoperative cardiac arrest, and death were lower for patients undergoing SG compared to RYGB (OR: 0.48, 0.49, and 0.54 respectively). CONCLUSION AND RELEVANCE: Prior cardiac history was associated with significant greater risk of perioperative cardiac arrest and 30-day mortality among patients undergoing bariatric surgery. SG was associated with less adverse events than RYGB among this population. While there is a clear benefit to weight loss in patients with CVD, it is important to consider whether cardiac

patients considering bariatric surgery may require additional preoperative optimization, perioperative interventions, and postoperative monitoring.

FEEDBACK

1. Arch Dis Child Fetal Neonatal Ed. 2020 Jan;105(1):41-44. doi:10.1136/archdischild-2018-316757. Epub 2019 May 17.

Impact of a mobile application for heart rate assessment in simulated neonatal resuscitation: a randomised controlled cross-over study.

Cavallin F(1), Binotti M(2), Ingrassia PL(3), Genoni G(4), Rizzollo S(4), Monzani A(4), Trevisanuto D(5).

Abstract

BACKGROUND: Clinical assessment of newborn heart rate (HR) at birth has been reported to be inaccurate. NeoTapAdvancedSupport (NeoTapAS) is a free-of-charge mobile application that showed good accuracy in HR estimation. This study aimed to evaluate the impact of NeoTapAS on timing of HR communication and resuscitation interventions. METHODS: This was a randomised controlled cross-over (AB/BA) study evaluating HR assessment using auscultation plus NeoTapAS compared with auscultation plus mental computation in a high-fidelity simulated newborn resuscitation scenario. Twenty teams each including three paediatric residents were randomly assigned to AB or BA arms. The primary outcome was the timing of the first HR communication. Secondary outcomes included the timing of the following four HR communications and the timing of resuscitation interventions (positive pressure ventilation, chest compressions, intubation and administration of first dose of epinephrine). RESULTS: NeoTapAS reduced the time to the first HR communication (mean difference -13 s, 95% CI -23 to -4; p=0.009), and the time of initiation of chest compressions (mean difference -68 s, 95% CI -116 to -18; p=0.01) and administration of epinephrine (mean difference -76 s, 95% CI -115 to -37; p=0.0004) compared with mental computation. CONCLUSIONS: In a neonatal resuscitation simulated scenario, NeoTapAS reduced the time to the first HR communication and the time of initiation of chest compressions and administration of epinephrine compared with mental computation. This app can be especially useful in settings with limited availability of monitoring equipment, but further studies in clinical scenarios are warranted.

FÀRMACS

1. Clin Ther. 2019 Dec 21. pii: S0149-2918(19)30517-X. doi:10.1016/j.clinthera.2019.11.001. [Epub ahead of print]

Frequency of Advanced Cardiac Life Support medication use and association with survival during in-hospital cardiac arrest.

Benz P(1), Chong S(2), Woo S(2), Brenner N(3), Wilson M(4), Dubin J(4), Heinrichs D(3), Titus S(3), Ahn J(2), Goyal M(4).

Abstract

PURPOSE: Cardiopulmonary resuscitation is common in the United States, with >200,000 people experiencing an in-hospital cardiac arrest (IHCA) annually. Recent medication shortages have raised the question of the frequency and type of medication used during cardiac arrest resuscitation. We sought to determine the frequency and quantity of medications used during IHCA. METHODS: This retrospective, single-center, medical record review was performed at a large, urban teaching hospital. Adults ≥18 years old who had an IHCA with confirmed loss of pulse between January 2017 and March 2018 were identified. A standardized data collection tool was used to extract data from the electronic medical record. The primary outcome was the frequency and quantity of medications used during the IHCA. Secondary outcomes included median time to defibrillation and frequency of sodium bicarbonate use, including among patients with end-stage renal disease (ESRD). FINDINGS: Criteria were met for 181 IHCA events. Demographic characteristics were 71% black, 17% white, mean age of 65 years, and 46% women. Epinephrine was given in 86.7% of the arrests, with a mean cumulative dose of 4.2 mg. Sodium bicarbonate was given in 63.5% of the arrests, with a mean cumulative dose

of 9.0 g (1.9 amps). Amiodarone was given in 30.9% of the arrests, with a mean cumulative dose of 311.8 mg. Median time to defibrillation was 2 min (interquartile range, 1-4 min). Preexisting ESRD was present in 24.8% of patients, of whom 71.1% received sodium bicarbonate. Sodium bicarbonate administration was associated with a lower likelihood of survival to discharge (odds ratio [OR] = 0.27; 95% CI, 0.11-0.66) as well as a lower rate of return to spontaneous circulation (ROSC) (OR = 0.35; 95% CI, 0.13-0.95). Magnesium administration was associated with a lower rate of ROSC (OR = 0.39; 95% CI, 0.15-0.98). Of note, in patients with preexisting ESRD, no medications were significantly associated with a change in likelihood of survival to discharge or rate of ROSC. In patients without preexisting ESRD, magnesium was associated with a lower rate of ROSC (OR = 0.23; 95% CI, 0.08-0.77). IMPLICATIONS: We found that in a hospital with established rapid response and code blue teams, numerous medications that are not recommended for routine use in cardiac arrest are still administered at significant frequencies. Furthermore, substantial amounts of drugs with known recent shortage are used in IHCA. Inc.

TRAUMA

1. Emerg Med Australas. 2019 Dec 22. doi: 10.1111/1742-6723.13443. [Epub ahead of print]

Feasibility study for implementation of resuscitative balloon occlusion of the aorta in peri-arrest, exsanguinating trauma at an adult level 1 Australian trauma centre.

Fitzgerald M(1)(2)(3), Lendrum R(4)(5)(6), Bernard S(3)(7)(8), Moloney J(3)(4)(9), Smit V(2)(8)(10), Mathew J(1)(2)(10), Kim Y(2), Nickson C(7)(11), Lin RM(7)(12), Yeung M(1)(2), Bystrzycki A(2)(10), Niggemeyer L(1)(2), Hendel S(1)(2)(4), Mitra B(2)(8)(10)(9).

Abstract

OBJECTIVE: This prospective, observational, interventional study sought to determine if the introduction of resuscitative balloon occlusion of the aorta (REBOA) at an Australian adult major trauma centre would improve survival for major trauma patients. METHODS: Patients aged 18-60 years, transported directly from scene with exsanguinating, sub-diaphragmatic haemorrhage and hypovolaemic shock (systolic BP <70 mmHg or hypovolaemic cardiac arrest) were eligible for recruitment and followed up until hospital discharge (ACTRN12618000550202). RESULTS: During the 14-month study period (17 January 2015 to 12 March 2016) 3032 patients were admitted direct from scene with an overall mortality of 97 (3.71%). Of these patients 3019 had trauma centre vital signs recorded in the data set (99.57%) and 1523 were between the ages of 18-60, including 143 patients with a shock index of >1.0 (4.74%). There were 13 (0.43%) patients with a systolic BP <70 mmHg and/or cardiorespiratory arrest on arrival. The mortality in this group was six out of 13 (46.15%). Of these 13 patients, there were two (0.07% of the total cohort) where REBOA was attempted. There were no eligible patients for whom REBOA was achieved. None of the six patients who died would have benefited from REBOA deployment. CONCLUSIONS: Despite considerable training and resource allocation to ensure 24-h availability, the introduction of REBOA failed to effectively demonstrate any impact on patient outcome. Despite retrospective literature supporting the introduction of REBOA, in this 14-month prospective study there was no evidence of benefit. Further studies may define indications and subgroups of patients who may benefit.

2. Shock. 2019 Dec 16. doi: 10.1097/SHK.0000000000001500. [Epub ahead of print]

Feasibility and Clinical Outcome of Reboa in Patients with Impending Traumatic Cardiac Arrest.

McGreevy DT(1), Abu-Zidan FM(2), Sadeghi M(1), Pirouzram A(1), Toivola A(1), Skoog P(3), Idoguchi K(4), Kon Y(5), Ishida T(6), Matsumura Y(7)(8), Matsumoto J(9), Reva V(10)(11), Maszkowski M(12), Bersztel A(12), Caragounis EC(13), Falkenberg M(14), Handolin L(15), Oosthuizen G(16), Szarka E(17), Manchev V(18), Wannatoop T(18), Chang SW(19), Kessel B(20), Hebron D(20), Shaked G(21), Bala

M(22), Coccolini F(23), Ansaloni L(23), Ordoñez CA(24), Dogan EM(1), Manning JE(25), Hibert-Carius P(26), Larzon T(1), Nilsson KF(1), Hörer TM(1).

Abstract

BACKGROUND: Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) may improve Systolic Blood Pressure (SBP) in hypovolemic shock. It has, however, not been studied in patients with impending traumatic cardiac arrest (ITCA). We aimed to study the feasibility and clinical outcome of REBOA in patients with ITCA using data from the ABOTrauma Registry. METHODS: Retrospective and prospective data on the use of REBOA from 16 centers globally were collected. SBP was measured both at pre- and post-REBOA inflation. Data collected included patients' demography, vascular access technique, number of attempts, catheter size, operator, zone and duration of occlusion, and clinical outcome. RESULTS: There were 74 patients in this high-risk patient group. REBOA was performed on all patients. A 7-10Fr catheter was used in 66.7%, 58.5% were placed on the first attempt, 52.1% through blind insertion and 93.2% inflated in Zone I, 64.8% for a period of 30 to 60 minutes, 82.1% by ER doctors, trauma surgeons or vascular surgeons. SBP significantly improved to 90 mmHg following the inflation of REBOA. 36.6% of the patients survived. CONCLUSIONS: Our study has shown that REBOA may be performed in patients with ITCA, SBP can be elevated and 36.6% of the patients survived if REBOA placement is successful.

MONITORATGE CEREBRAL

1. Chest. 2019 Dec 20. pii: S0012-3692(19)34449-6. doi: 10.1016/j.chest.2019.11.037. [Epub ahead of print]

Neurological Pupil Index for Early Prognostication Following Veno-Arterial Extracorporeal Membrane Oxygenation.

Miroz JP(1), Ben-Hamouda N(2), Bernini A(3), Romagnosi F(3), Bongiovanni F(3), Roumy A(4), Kirsch M(4), Liaudet L(2), Eckert P(2), Oddo M(5).

Abstract

BACKGROUND: Veno-arterial extra-corporeal membrane oxygenation therapy (VA-ECMO) following refractory cardiogenic shock (r-CS) or cardiac arrest (r-CA) has significant morbidity and mortality. Early outcome prediction is crucial in this setting, but data on neuro-prognostication are limited. We examined the prognostic value of clinical neurological examination, using an automated device for the quantitative measurement of pupillary light reactivity. METHODS: An observational cohort of sedated mechanically ventilated VA-ECMO patients was analyzed at the early phase following ECMO insertion (first 72 hours). Using the NPi®-200 automated infrared pupillometer, pupillary light reactivity was assessed repeatedly (every 12 hours) by calculating the Neurological Pupil index (NPi). Trends of NPi over time were correlated to 90-day mortality, and the prognostic performance of the NPi, alone and in combination with the 12-h PREDICT VA-ECMO score, was evaluated. RESULTS: A total 100 consecutives patients were studied (51 r-CS/49 r-CA; 12-h PREDICT VA-ECMO 40%; observed 90-day survival 43%). Non-survivors (n=57) had significantly lower NPi than survivors at all time-points (all $p<0.01$). Abnormal NPi (<3, at any time from 24 to 72 hours) was 100% specific for 90-day mortality, with 0% false positives. Adding 12-h PREDICT VA-ECMO score to the NPi provided the best prognostic performance (specificity 100% [95% confidence interval 91-100%], sensitivity 60% [46-72%], area under the ROC curve 0.82). CONCLUSIONS: Quantitative NPi alone had excellent ability to predict a poor outcome from day 1 after VA-ECMO insertion, with no false positives. Combining NPi and 12-h PREDICT-VA ECMO score increased sensitivity of outcome prediction, while maintaining 100% specificity.

ORGANITZACIÓ I ENTRENAMENT

1. Am J Emerg Med. 2019 Dec 9. pii: S0735-6757(19)30788-0. doi:10.1016/j.ajem.2019.11.045. [Epub ahead of print]

Computerized data mining analysis of keywords as indicators of the concepts in AHA-BLS guideline updates.

Sekiguchi H(1), Fukuda T(2), Tamaki Y(2), Hanashiro K(3), Satoh K(4), Ueno E(5), Kukita I(2).

Abstract

INTRODUCTION: Cardiopulmonary resuscitation (CPR) guidelines have been updated every 5 years since 2000. Significant changes have been made in each update, and every time a guideline is changed, the instructors of each country that ratify the American Heart Association (AHA) must review the contents of the revised guideline to understand the changes made in the concept of CPR. The purpose of this study was to use a computerized data mining method to identify and characterize the changes in the key concepts of the AHA-Basic Life Support (BLS) updates between 2000 and 2015. METHODS: We analyzed the guidelines of the AHA-BLS provider manual of 2000, 2005, 2010, and 2015 using a computerized data mining method and attempted to identify the changes in keywords along with changes in the guideline. RESULTS: In particular, the 2000 guideline has focused on the detailed BLS technique of an individual health care provider, whereas the 2005 and 2010 guidelines have focused on changing the ratio of chest compressions and breathing and changing the BLS sequence, respectively. In the most recent 2015 guideline, the CPR team was the central topic. We observed that as the guidelines were updated over the years, keywords related to CPR and automated external defibrillators (AED) associated with co-occurrence network continued to appear. CONCLUSIONS: Analysis revealed that keywords related to CPR and AED associated with the co-occurrence network continued to appear. We believe that the results of this study will ultimately contribute to optimizing AHA's educational strategies for health care providers.

2. J Am Geriatr Soc. 2019 Dec 15. doi: 10.1111/jgs.16270. [Epub ahead of print]

Cardiopulmonary Resuscitation in Adults Over 80: Outcome and the Perception of Appropriateness by Clinicians.

Druwé P(1), Benoit DD(1), Monsieurs KG(2), Gagg J(3), Nakahara S(4), Alpert EA(5), van Schuppen H(6), Élő G(7), Huybrechts SA(2), Mpotos N(8), Joly LM(9), Xanthos T(10), Roessler M(11), Paal P(12), Cocchi MN(13), Bjørshol C(14), Nurmi J(15), Salmeron PP(16), Owczuk R(17), Svavarsdóttir H(18), Cimpoesu D(19), Raffay V(20), Pachys G(21), De Paepe P(22), Piers R(23); REAPPROPRIATE study group.

Abstract

OBJECTIVES: To determine the prevalence of clinician perception of inappropriate cardiopulmonary resuscitation (CPR) regarding the last out-of-hospital cardiac arrest (OHCA) encountered in an adult 80 years or older and its relationship to patient outcome. DESIGN: Subanalysis of an international multicenter cross-sectional survey (REAPPROPRIATE). SETTING: Out-of-hospital CPR attempts registered in Europe, Israel, Japan, and the United States in adults 80 years or older. PARTICIPANTS: A total of 611 clinicians of whom 176 (28.8%) were doctors, 123 (20.1%) were nurses, and 312 (51.1%) were emergency medical technicians/paramedics. RESULTS AND MEASUREMENTS: The last CPR attempt among patients 80 years or older was perceived as appropriate by 320 (52.4%) of the clinicians; 178 (29.1%) were uncertain about the appropriateness, and 113 (18.5%) perceived the CPR attempt as inappropriate. The survival to hospital discharge for the "appropriate" subgroup was 8 of 265 (3.0%), 1 of 164 (.6%) in the "uncertain" subgroup, and 2 of 107 (1.9%) in the "inappropriate" subgroup (P = .23); 503 of 564 (89.2%) CPR attempts involved non-shockable rhythms. CPR attempts in nursing homes accounted for 124 of 590 (21.0%) of the patients and were perceived as appropriate by 44 (35.5%) of the clinicians; 45 (36.3%) were uncertain about the appropriateness; and 35 (28.2%) perceived the CPR attempt as inappropriate. The survival to hospital discharge for the nursing home patients was 0 of 107 (0%); 104 of 111 (93.7%) CPR attempts involved non-shockable rhythms. Overall, 36 of 543 (6.6%) CPR attempts were undertaken despite a known written do not attempt resuscitation decision; 14 of 36 (38.9%) clinicians considered this appropriate, 9 of 36 (25.0%) were uncertain about its appropriateness, and 13 of 36 (36.1%) considered this inappropriate. CONCLUSION: Our findings show that despite generally poor outcomes for older patients undergoing CPR, many emergency clinicians do not consider these attempts at resuscitation to be inappropriate. A professional and societal debate is urgently needed to ensure that first we do not harm older patients by futile CPR attempts.

4. Resuscitation. 2019 Dec 20. pii: S0300-9572(19)30732-4. doi:10.1016/j.resuscitation.2019.12.009. [Epub ahead of print]

Effect of Awareness Time Interval for Out-of-Hospital Cardiac Arrest on Outcomes: A Nationwide Observational Study.

Ko SY(1), Shin SD(2), Song KJ(3), Park JH(4), Lee SC(5).

Abstract

PURPOSE: Awareness of out-of-hospital cardiac arrest (OHCA) is critically important for bystanders to receive early instruction of dispatch-assisted cardiopulmonary resuscitation (DA-CPR) as well as to call for ambulance services. This study aimed to determine the association between awareness time interval and outcomes. METHODS: EMS-treated, witnessed, adult (≥18 years old) OCHAs with presumed cardiac etiology between 2012 and 2017 were analyzed, excluding patients with unknown awareness time factors and outcomes. The main exposure was awareness time interval (ATI), defined as the time from the witnessed event to calling for ambulance. Patients were categorized into five groups according to ATI: Group 1 (0-1 minute), Group 2 (2-3 minute), Group 3 (4-5 minute), Group 4 (6-30 minute) and Group 5 (31-60 minute). The primary outcome was good neurological recovery defined as cerebral performance category 1 or 2 (good CPC). Multivariable logistic regression analysis was performed to calculate adjusted odds ratios (AORs) and 95% confidence intervals (CIs) for outcomes by ATI group (reference = Group 1) and by one-minute delay. We compared the effect size of ATI on outcomes across three witness groups (Layperson, Family, and Unknown). RESULTS: A total of 36,809 OHCAs were analyzed. The AOR (95% CI) by one-minute ATI delay was 0.91 (0.90-0.92) for good CPC. The AORs (95% CIs) for outcomes compared with Group 1 were 0.98 (0.88-1.09) for Group 2, 0.64 (0.56-0.74) for Group 3, 0.30 (0.26-0.35) for Group 4, and 0.10 (0.05-0.20) for Group 5. In the Family bystander group, AORs (95% CIs) compared with Group 1 were significantly decreased by delay of ATI; 1.04 (0.88-1.11) for Group 2, 0.63 (0.81-0.83) for Group 3, and 0.31 (0.31-0.40) for Group 4 and 5. In Layperson-witnessed OHCAs, however, the AORs were significantly higher in the delayed awareness groups (Group 2 and Group 3). CONCLUSION: A longer ATI in witnessed adult OHCAs was associated with poor neurological recovery. A one-minute delay in ATI was associated with a 9% decrease of good neurological recovery, and the effect was significantly increased in Family-witnessed OHCAs.

5. Resuscitation. 2019 Dec 13;147:12-20. doi: 10.1016/j.resuscitation.2019.12.004. [Epub ahead of print]

Comparison of the effects of audio-instructed and video-instructed dispatcher-assisted cardiopulmonary resuscitation on resuscitation outcomes after out-of-hospital cardiac arrest.

Lee SY(1), Song KJ(2), Shin SD(3), Hong KJ(4), Kim TH(5).

Abstract

BACKGROUND: This study compared the real-world effects of audio-instructed dispatcher-assisted cardiopulmonary resuscitation (DA-CPR) and video-instructed DA-CPR on resuscitation outcomes after out-of-hospital cardiac arrest (OHCA). METHODS: A retrospective cohort study was conducted among adult OHCA patients in whom resuscitation was attempted in 2017 in Seoul, Korea. The dispatch center of Seoul introduced video-instructed DA-CPR in 2017, whereas audio-instructed DA-CPR was first implemented in 2010. When more than two bystanders were at the scene and could handle a video-call, the dispatcher call back a video-call and provided CPR instructions. In other situations, standard audio-instructed DA-CPR was provided. The primary outcome was survival to discharge. The secondary outcome was good neurological outcome at hospital discharge. The tertiary outcome was early instruction time interval (ITI, time from call to the initiation of CPR instruction ≤90 s). The study outcomes of audio-instructed DA-CPR (audio group) and video-instructed DA-CPR (video group) were compared. The propensity score matching (PSM) method was used to increase the comparability of the two groups and the logistic regression was performed for the PSM cohort. RESULTS: A total of 1720 eligible OHCA patients (1489 and 231 in the audio and video groups, respectively) were evaluated. The median ITI was 136 s in the audio group and 122 s in the video group ($p = 0.12$). The survival to discharge rates were 8.9% in the audio group and 14.3% in the video groups ($p < 0.01$). Good

neurological outcome occurred in 5.8% and 10.4% in the audio and video groups, respectively ($p < 0.01$). Compared to the audio group, the AORs (95% CIs) for survival to discharge, good neurological outcome and early ITI of the video group were 1.20 (0.74-1.94), 1.28 (0.73-2.26) and 1.00 (0.70-1.43), respectively. The PSM population showed similar results as those of the original cohort. CONCLUSION: Compared to audio-instructed DA-CPR, video-instructed DA-CPR was not associated with survival improvement in this observational study conducted in one metropolitan city. Randomized controlled trials are needed to compare the effects of video- and audio-instructed DA-CPR.

6. Scand J Trauma Resusc Emerg Med. 2019 Dec 23;27(1):114. doi: 10.1186/s13049-019-0683-6.

Development, validation and assessment of the test on knowledge about basic life support and use of automated external defibrillator among schoolchildren.

Borovnik Lesjak V(1), Šorgo A(2)(3), Strnad M(4)(5).

Abstract

BACKGROUND: Educating lay public can significantly strengthen the Chain of Survival after out of hospital cardiac arrest. Schoolchildren are an accessible population for learning basic life support (BLS) and use of an automated external defibrillator (AED) and can be regarded as multipliers of knowledge that can reach the whole population. This study aimed to develop and validate a test for examining levels of knowledge about BLS and AED among schoolchildren that can be used to uniformly present reliable data. METHODS: A knowledge test about BLS and AED consisting of 10 multiple-choice questions was developed and implemented before and after a 2-h BLS and AED course consisting of an interactive lecture and a practical workshop for 783 students in seventh and ninth grades of elementary schools in Maribor, Slovenia. Each question was analyzed and presented with descriptive statistics and educometric parameters (difficulty and discriminating indices). All variables were checked for normality with the Kolmogorov-Smirnov test and analyzed using non-parametric tests. Statistical significance of the differences in knowledge before and after intervention were calculated with chi-square statistics and effect sizes r are reported. Differences between genders, grades and previous attendance to BLS courses were compared using Mann - Whitney U test. The effect size was calculated from the Z score and reported as r value. RESULTS: After educometric analysis, questions were adjusted to meet the requirements of satisfactory functioning difficulty and discriminating indices (values between 0,40 and 0,60, and above 0,20, respectively). Only one question had to be eliminated due to inadequate difficulty and discriminating index (0,99 and 0,02, respectively). Measurement invariance across gender ($p < 0,001$), school grade ($p < 0,001$), and attendance to previous courses ($p = 0,303$) was assured. CONCLUSIONS: A test for accurate and reliable measurement of knowledge of BLS and AED among schoolchildren was developed and validated. According to the findings it can now reliably be used to assess baseline knowledge and potential improvement in knowledge after a course on BLS and AED. Standardized data gathered with a validated tool can now be presented at legislative levels to promote BLS and AED courses implementation in school curricula.

FREE FULL TEXT

7. Scand J Trauma Resusc Emerg Med. 2019 Dec 16;27(1):112. doi:10.1186/s13049-019-0689-0.

First-response treatment after out-of-hospital cardiac arrest: a survey of current practices across 29 countries in Europe.

Oving I(1), Masterson S(2), Tjelmeland IBM(3), Jonsson M(4), Semeraro F(5), Ringh M(4), Truhlar A(6), Cimpoesu D(7), Folke F(8)(9), Beesems SG(1), Koster RW(1), Tan HL(10)(11), Blom MT(1); ESCAPE-NET Investigators.

Abstract

BACKGROUND: In Europe, survival rates after out-of-hospital cardiac arrest (OHCA) vary widely. Presence/absence and differences in implementation of systems dispatching First Responders (FR) in order to arrive before Emergency Medical Services (EMS) may contribute to this variation. A comprehensive overview of the different types of FR-systems used across Europe is lacking. METHODS: A mixed-method survey and information retrieved from national resuscitation councils and national EMS services were used as a basis for an inventory. The survey was sent to 51 OHCA experts across 29 European countries. RESULTS: Forty-seven (92%) OHCA experts from 29 countries responded to the

survey. More than half of European countries had at least one region with a FR-system. Four categories of FR types were identified: (1) firefighters (professional/voluntary); (2) police officers; (3) citizen-responders; (4) others including off-duty EMS personnel (nurses, medical doctors), taxi drivers. Three main roles for FRs were identified: (a) complementary to EMS; (b) part of EMS; (c) instead of EMS. A wide variation in FR-systems was observed, both between and within countries. CONCLUSIONS: Policies relating to FRs are commonly implemented on a regional level, leading to a wide variation in FR-systems between and within countries. Future research should focus on identifying the FR-systems that most strongly influence survival. The large variation in local circumstances across regions suggests that it is unlikely that there will be a 'one-size fits all' FR-system for Europe, but examining the role of FRs in the Chain of Survival is likely to become an increasingly important aspect of OHCA research.
FREE FULL TEXT

CURES POST-RCE

1. Eur J Intern Med. 2019 Dec 16. pii: S0953-6205(19)30427-3. doi:10.1016/j.ejim.2019.11.024. [Epub ahead of print]

Long term clinical outcomes in survivors after out-of-hospital cardiac arrest.

Rey JR(1), Caro-Codón J(2), Rodríguez Sotelo L(2), López-de-Sa E(2), Rosillo SO(2), González Fernández Ó(2), Fernández de Bobadilla J(2), Iniesta ÁM(2), Peña Conde L(2), Antorrena Miranda I(2), Armada E(2), Ruiz Cantador J(2), López-Sendón JL(2).

Abstract

INTRODUCTION AND OBJECTIVES: Information regarding long-term outcomes in patients surviving out-of-hospital cardiac arrest (OHCA) is scarce. Our aim was to study the long-term clinical outcomes of a large cohort of OHCA patients surviving until hospital discharge and to identify predictors of mortality and cardiovascular events. METHODS: Consecutive OHCA patients admitted in the Acute Cardiac Care Unit who survived at least until hospital discharge between 2007 and 2019 were included. All received therapeutic hypothermia according to the local protocol. Pre- and intra-hospital clinical and analytical variables were analyzed, as well as the clinically relevant events during follow-up. RESULTS: A total of 201 patients were included, with a mean age of 57.6 ± 14.2 years, 168 (83.6%) were male. Thirty-six (17.9%) died during a median follow-up of 40.3 months (18.9-69.1), the most frequent causes of death being cardiovascular and neurological, followed by cancer. We calculated a predictive model for mortality during follow-up using Cox regression that included the following variables: poor neurological outcome [HR 3.503 (1.578-7.777)], non-shockable rhythm [HR 2.926 (1.390-6.163)], time to onset of CPR [HR 1.063 (0.997-1.134)], older age [1.036 (1.008-1.064)) and worse ejection fraction at discharge [1.033 (1.009-1.058)]. CONCLUSIONS: Even though few patients experience recurrent cardiac arrest events, survivors after OHCA face high morbidity and mortality during long-term follow-up. Therefore, they may benefit from multidisciplinary teams providing an integral management and ensuring continuity of care.

2. Resuscitation. 2019 Dec 17. pii: S0300-9572(19)30729-4. doi: 10.1016/j.resuscitation.2019.12.006. [Epub ahead of print]

Out-of-hospital cardiac arrest: 30-day survival and 1-year risk of anoxic brain damage or nursing home admission according to consciousness status at hospital arrival.

Sondergaard KB(1), Riddersholm S(2), Wissenberg M(3), Moller Hansen S(4), Barcella CA(5), Karlsson L(3), Bundgaard K(6), Lippert FK(7), Kjaergaard J(8), Gislason GH(9), Folke F(3), Torp-Pedersen C(10), Kragholm K(11).

Abstract

AIM: To investigate the association between consciousness status at hospital arrival and long-term outcomes in out-of-hospital cardiac arrest (OHCA) patients. METHODS: OHCAs between 18-100 years of age were identified from the Danish Cardiac Arrest Registry during 2005-2014. Patients with return of spontaneous circulation (ROSC) or ongoing cardiopulmonary resuscitation (CPR) at hospital arrival were included. Thirty-day survival was evaluated using Kaplan-Meier estimates. Risk of anoxic brain

damage or nursing home admission and return to work among 30-day survivors were evaluated using Aalen-Johansen estimates and cause-specific Cox regression. RESULTS: Upon hospital arrival of 13,953 OHCA patients, 776 (5.6%) had ROSC and were conscious (Glasgow Coma Score [GCS]>8), 5205 (37.3%) had ROSC, but were comatose (GCS ≤ 8), and 7972 (57.1%) had ongoing CPR. Thirty-day survival according to status at hospital arrival among patients that were conscious, comatose, or had ongoing CPR was 89.0% (95% confidence interval [CI] 86.8%-91.2%), 39.0% (95% CI 37.6%-40.3%), and 1.2% (95% CI 1.0%-1.4%), respectively. Among 30-day survivors, 1-year risks of new onset anoxic brain damage or nursing home admission according to consciousness status were 2.4% (95% CI 1.2%-3.6%), 12.9% (95% CI 11.4%-14.3%), and 19.4% (95% CI 11.3%-27.4%), respectively. Among 30-day working-age survivors, more than 65% in each group returned to work within 5 years. CONCLUSION: Consciousness status at hospital arrival was strongly associated with 30-day survival in OHCA patients. Among 30-day survivors, a minority was diagnosed with anoxic brain damage or admitted to a nursing home and the majority returned to work independent of consciousness status at hospital arrival.

3. Resuscitation. 2019 Dec 16;147:34-42. doi: 10.1016/j.resuscitation.2019.12.005. [Epub ahead of print]

Low rates of immediate coronary angiography among young adults resuscitated from sudden cardiac arrest.

Waldmann V(1), Karam N(1), Rischard J(2), Bougouin W(3), Sharifzadehgan A(1), Dumas F(4), Narayanan K(5), Sideris G(6), Voicu S(7), Gandjbakhch E(8), Jost D(9), Lamhaut L(10), Ludes B(11), Plu I(12), Beganton F(13), Wahbi K(14), Varenne O(14), Megarbane B(7), Algalarrondo V(15), Extramiana F(15), Lellouche N(16), Celermajer DS(17), Spaulding C(18), Lafont A(18), Cariou A(19), Jouven X(1), Marijon E(20); On Behalf Paris-SDEC investigators.

Abstract

AIM: Coronary artery disease (CAD) has recently been emphasized as a major cause of sudden cardiac arrest (SCA) in young adults. We aim to assess the rate of immediate coronary angiography performance in young patients resuscitated from SCA. METHODS: From May 2011 to May 2017, all cases of out-of-hospital SCA aged 18-40 years alive at hospital admission were prospectively included in 48 hospitals of the Great Paris area. Cardiovascular causes of SCA were centrally adjudicated, and management including immediate coronary angiography performance was assessed. RESULTS: Out of 3579 SCA admitted alive, 409 (11.4%) patients were under 40 years of age (32.3 ± 6.2 years, 69.7% males), with 244 patients having a definite cause identified. Among those, CAD accounted for 72 (29.5%) cases, of which 64 (88.9%) were acute coronary syndromes. The rate of immediate coronary angiography was only 41.7% compared to 65.1% among those ≥40-years (P < 0.001). During the study period, while the rate of immediate coronary angiography increased from 60.5% to 70.3% (P < 0.001) in patients aged ≥40 years, the rate in patients aged less than 40 years remained stable (43.5% to 45.3%, P = 0.795). Patients younger than 40 years were significantly less likely to undergo immediate coronary angiography (OR = 0.34, 95% CI: 0.25-0.47), although early angiography was associated with survival at hospital discharge (OR = 2.68, 95% CI: 1.21-6.00). CONCLUSION: CAD is the first cause of SCA in young adults aged less than 40 years. The observed low rates of immediate coronary angiography suggest a missed opportunity for early intervention.

ELECTROFISIOLOGIA I DESFIBRIL·LACIÓ

1. Lancet. 2020 Dec 21;394(10216):2255-2262. doi: 10.1016/S0140-6736(19)32488-2. Epub 2019 Dec 17.

Public-access defibrillation and neurological outcomes in patients with out-of-hospital cardiac arrest in Japan: a population-based cohort study.

Nakashima T(1), Noguchi T(1), Tahara Y(2), Nishimura K(1), Yasuda S(1), Onozuka D(3), Iwami T(4), Yonemoto N(5), Nagao K(6), Nonogi H(7), Ikeda T(8), Sato N(9), Tsutsui H(10); Japanese Circulation Society with Resuscitation Science Study Group.

Abstract

BACKGROUND: More than 80% of public-access defibrillation attempts do not result in sustained return of spontaneous circulation in patients who have had an out-of-hospital cardiac arrest (OHCA) and a shockable heart rhythm before arrival of emergency medical service (EMS) personnel. Neurological and survival outcomes in such patients have not been evaluated. We aimed to assess the neurological status and survival outcomes in such patients. METHODS: This is a retropective analysis of a cohort study from a prospective, nationwide, population-based registry of 1 299 784 patients who had an OHCA event between Jan 1, 2005, and Dec 31, 2015 in Japan. The primary outcome was favourable neurological outcome (Cerebral Performance Category of 1 or 2) at 30 days after the OHCA and the secondary outcome was survival at 30 days following the OHCA. This study is registered with the University Hospital Medical Information Network Clinical Trials Registry, UMIN000009918. FINDINGS: We identified 28 019 patients with bystander-witnessed OHCA and shockable heart rhythm who had received CPR from a bystander. Of these, 2242 (8·0%) patients did not achieve return of spontaneous circulation with CPR plus public-access defibrillation, and 25 087 (89·5%) patients did not achieve return of spontaneous circulation with CPR alone before EMS arrival. The proportion of patients with a favourable neurological outcome was significantly higher in those who received public-access defibrillation than those who did not (845 [37·7%] vs 5676 [22·6%]; adjusted odds ratio [OR] after propensity score-matching, 1·45 [95% CI 1·24-1·69], p<0·0001). The proportion of patients who survived at 30 days after the OHCA was also significantly higher in those who received public-access defibrillation than those who did not (987 [44·0%] vs 7976 [31·8%]; adjusted OR after propensity score-matching, 1·31 [95% CI 1·13-1·52], p<0·0001). INTERPRETATION: Our findings support the benefits of public-access defibrillation and greater accessibility and availability of automated external defibrillators in the community. FUNDING: None.

PEDIATRICS AND CHILDREN

1. Pediatr Emerg Care. 2019 Dec 13. doi: 10.1097/PEC.0000000000001923. [Epub ahead of print]

A Pulse Check on Leadership and Teamwork: An Evaluation of the First 5 Minutes of Emergency Department Resuscitation During Pediatric Cardiopulmonary Arrests.

Grimsley EA(1)(2), Cochrane NH(1)(3), Keane RR(1)(3), Sumner BD(1)(4), Mullan PC(5), O'Connell KJ(1)(6).

Abstract

OBJECTIVES: Effective leadership and teamwork are imperative during pediatric cardiopulmonary resuscitations (CPR). The initial phase of pediatric CPR, termed the "first 5 minutes," has significant care delivery gaps in both leadership and team performance. The aim of the study was to describe the performance data of emergency department (ED) teams who performed CPR in a pediatric ED. METHODS: We conducted a retrospective video review of resuscitations involving pediatric patients younger than 21 years who presented in cardiac arrest to a tertiary pediatric ED. Descriptive statistics were used for data analysis. RESULTS: Twenty events met study inclusion criteria. Prearrival task completion included the following: estimated weight (90%), airway set-up (85%), epinephrine dose prepared (84%), defibrillator ready (75%), and intraosseous kit ready (50%). Median prearrival notification time was 5 minutes 34 seconds (interquartile range = 4:44-7:13) with no significant relationship between prearrival time and task completion. Within the first 5 minutes, the team leader provided a care summary in 84%, prioritized tasks in 95%, and assigned roles for airway management (90%), intravenous/intravenous access (63%), and CPR/pulse check (63%). Most critical tasks were completed within 1 minute; however, only 25% had defibrillator pads placed within the 5-minute window. CONCLUSIONS: Our study of leadership and teamwork during the first 5 minutes of pediatric CPR care noted wide variation in team performance. Opportunities for improvements in CPR readiness can be incorporated into education and quality programs to drive improvements in the care of future pediatric patients experiencing cardiac arrest.

ECMO

1. Eur J Anaesthesiol. 2019 Dec 12. doi: 10.1097/EJA.0000000000001142. [Epub ahead of print]

Extracorporeal cardiopulmonary resuscitation at the emergency department: A retrospective patient selection evaluation.

Poppe M(1), Schriefl C, Steinacher A, Clodi C, Warenits AM, Nürnberger A, Hubner P, Holzer M, Horvat J, Wiedemann D, Weiser C.

Abstract

BACKGROUND: There is an increasing use of extracorporeal life support in refractory cardiac arrest. Recent studies highlighted the importance of an early and accurate patient selection for this invasive procedure. OBJECTIVES: The aim of this study was to retrospectively validate a six-criteria-screening-checklist (witnessed collapse, bystander-cardiopulmonary resuscitation/first medical contact <5 min, shockable, age <70 years, end tidal carbon dioxide >14 mmHg and pupils not anisocoric/distorted/mydriatic) as an early screening tool in patients treated with extracorporeal cardiopulmonary resuscitation (eCPR) at the emergency department. DESIGN: Retrospective observational study. SETTING/PATIENTS: All patients at least 18 years of age with nontraumatic cardiac arrest and without return of spontaneous circulation before eCPR treatment at our department between January 2013 and December 2018 were included in this retrospective observational study. INTERVENTION: No specific intervention was set in this observational study. MAIN OUTCOME MEASURES: Primary outcome was the rate of patients who fulfilled all criteria, secondary outcome was 30-day and 6-month survival in accordance with the criteria. RESULTS: Overall, data from a total of 92 patients were eligible for analyses. Out of these, 27 patients (29%) met all criteria. Patients, who fulfilled all criteria, showed significantly higher odds for 30-day survival [OR 6.0 (95% CI 1.78 to 20.19)] P = 0.004. Patients, who did not fulfil all criteria, showed significantly higher rates of early mortality after eCPR initiation [OR 4.57 (95% CI 1.69 to 12.37)] P = 0.003. CONCLUSION: Patients fulfilling all inclusion criteria showed higher rates of survival after eCPR. Our results affirm that there is a possibility and even an obvious necessity for early patient selection based on standardised criteria before eCPR treatment. Large randomised trials are urgently needed to answer this question accurately.

2. J Invasive Cardiol. 2019 Dec 15. pii: JIC20191215-3. [Epub ahead of print]

Initiation of Extracorporeal Membrane Oxygenation in the Cardiac Catheterization Laboratory: The Mayo Clinic Experience.

Ternus B(1), Jentzer J, Bohman K, Barsness G, Schears G, Rihal C, Sandhu G.

Abstract

INTRODUCTION: Extracorporeal membrane oxygenation (ECMO) support is indicated for the management of patients with cardiogenic shock or refractory cardiac arrest in the cardiac catheterization laboratory. The aim of this study was to review the outcomes of patients initiated on ECMO support in the cardiac catheterization laboratory. METHODS: We performed a retrospective analysis of adult patients (>18 years old) initiated on ECMO support in the cardiac catheterization laboratory from 2010-2017. Baseline demographics, clinical characteristics, procedural details, and indication for ECMO support were reviewed. The outcomes assessed included 30-day mortality, blood product transfusion, vascular injury, prolonged respiratory failure, stroke, ischemic bowel, renal failure requiring hemodialysis, and compartment syndrome. RESULTS: Between January 1, 2010 and December 31, 2017, a total of 25 patients were cannulated for ECMO in the cardiac catheterization laboratory. The mean age was 61 years and 56% of patients were men. Cardiac arrest was the most frequent indication for ECMO support (64%), followed by cardiogenic shock (28%). The 30-day mortality rate was 40%. The most frequent complications associated with ECMO were the need for vascular surgery (52%) and renal failure requiring hemodialysis (36%). The univariate predictors of 30-day mortality were age (P=.02; unit odds ratio [OR], 1.08; 95% confidence interval [CI], 1.01-1.15), history of tobacco use (P=.04; OR, 6; 95% CI, 1.01-35.91), and Apache IV score (P=.02; unit OR, 1.02; 95% CI, 1.01-1.09). CONCLUSIONS: ECMO should be considered early during the resuscitation attempts of selected patients with ongoing cardiopulmonary resuscitation or refractory cardiogenic shock in the cardiac catheterization laboratory.

FREE FULL TEXT

4. Scand J Trauma Resusc Emerg Med. 2019 Dec 16;27(1):113. doi: 10.1186/s13049-019-0694-3.
Intra-patient potassium variability after hypothermic cardiac arrest: a multicentre, prospective study.
Pasquier M(1), Blancher M(2), Buse S(2), Boussat B(2), Debaty G(2), Kirsch M(3), de Riedmatten M(4), Schoettker P(5), Annecke T(6), Bouzat P(7).
Abstract
BACKGROUND: To date, the decision to set up therapeutic extra-corporeal life support (ECLS) in hypothermia-related cardiac arrest is based on the potassium value only. However, no information is available about how the analysis should be performed. Our goal was to compare intra-individual variation in serum potassium values depending on the sampling site and analytical technique in hypothermia-related cardiac arrests. METHODS: Adult patients with suspected hypothermia-related refractory cardiac arrest, admitted to three hospitals with ECLS facilities were included. Blood samples were obtained from the femoral vein, a peripheral vein and the femoral artery. Serum potassium was analysed using blood gas (BGA) and clinical laboratory analysis (CL). RESULTS:
Of the 15 consecutive patients included, 12 met the principal criteria, and 5 (33%) survived. The difference in average potassium values between sites or analytical method used was ≤1 mmol/L. The agreement between potassium values according to the three different sampling sites was poor. The ranges of the differences in potassium using BGA measurement were - 1.6 to + 1.7 mmol/L; - 1.18 to + 2.7 mmol/L and - 0.87 to + 2 mmol/L when comparing respectively central venous and peripheral venous, central venous and arterial, and peripheral venous and arterial potassium. CONCLUSIONS:
We found important and clinically relevant variability in potassium values between sampling sites. Clinical decisions should not rely on one biological indicator. However, according to our results, the site of lowest potassium, and therefore the preferred site for a single potassium sampling is central venous blood. The use of multivariable prediction tools may help to mitigate the risks inherent in the limits of potassium measurement. TRIAL REGISTRATION: ClinicalTrials.gov Identifier: NCT03096561.
FULL FREE TEXT

RECERCA EXPERIMENTAL

1. BMC Neurosci. 2019 Dec 21;20(1):62. doi: 10.1186/s12868-019-0544-2.
Amiodarone exacerbates brain injuries after hypoxic-ischemic insult in mice.
Kotoda M(1)(2), Hishiyama S(3), Ishiyama T(4), Mitsui K(4), Matsukawa T(3).
Abstract
BACKGROUND: Sodium ion transportation plays a crucial role in the pathogenesis of hypoxic-ischemic brain injury. Amiodarone, a Vaughan-Williams class III antiarrhythmic drug, has been widely used to treat life-threatening arrhythmia and cardiac arrest worldwide. In addition to its inhibitory effects on the potassium channel, amiodarone also blocks various sodium ion transporters, including the voltage-gated sodium channel, sodium pump, and Na^+/Ca^+ exchanger. Considering these pharmacological profile, amiodarone may affect the influx-efflux balance of sodium ion in the hypoxic-ischemic brain. Previous studies suggest that the blockade of the voltage-gated sodium channel during hypoxic-ischemic brain injury exerts neuroprotection. On the contrary, the blockade of sodium pump or Na^+/Ca^+ exchanger during hypoxia-ischemia may cause further intracellular sodium accumulation and consequent osmotic cell death. From these perspectives, the effects of amiodarone on sodium ion balance on the hypoxic-ischemic brain can be both protective and detrimental depending on the clinical and pathophysiological conditions. In this study, we therefore investigated the effect of amiodarone on hypoxic-ischemic brain injury using a murine experimental model. RESULTS: Compared with the control group mice, mice that received amiodarone after induction of 40-min hypoxic-ischemic brain injury exhibited lower survival rates over 7 days and worse neurological function. After 25-min hypoxic-ischemic brain injury, amiodarone treated mice exhibited larger infarct volumes (16.0 ± 6.9 vs. 24.2 ± 6.8 mm^3, $P < 0.05$) and worse neurological function. In addition, the brains

harvested from the amiodarone-treated mice contained larger amounts of sodium (194.7 ± 45.1 vs. 253.5 ± 50.9 mEq/kg dry weight, P < 0.01) and water (259.3 ± 8.9 vs. 277.2 ± 12.5 mg, P < 0.01). There were no significant differences in hemodynamic parameters between groups. CONCLUSIONS: Amiodarone exacerbated brain injuries and neurological outcomes after hypoxic-ischemic insults. Severe brain sodium accumulation and brain edema were associated with the detrimental effects of amiodarone. Amiodarone at the clinical dose can exacerbate brain injury after hypoxic-ischemic insult by affecting sodium ion transportation and facilitate intracellular sodium accumulation in the brain.
FREE FULL TEXT

2. Brain Res Bull. 2020 Feb;155:145-154. doi: 10.1016/j.brainresbull.2019.12.008. Epub 2019 Dec 14.
Resveratrol attenuates neuroinflammation after deep hypothermia with circulatory arrest in rats.
Chen Q(1), Sun KP(2), Huang JS(3), Wang ZC(4), Hong ZN(5).
Abstract
Deep hypothermia with circulatory arrest (DHCA) in cardiac surgery may exert a significant burden on the neuroinflammation which can cause brain injury. Resveratrol is a natural product and acts as a neuroprotective agent to suppress inflammatory response in brain. Even so, the specific mechanism regarding brain protective effect of resveratrol in DHCA is still unclear. In the current research, we tested brain protective function of resveratrol on neuroinflammation and cognition in rat DHCA model or hypothermic oxygen-glucose deprivation (OGD) model. The activation of microglial, cell apoptosis, inflammation in brain and circulation, NF-κB pathway were evaluated. We found that resveratrol treatment improved neurocognitive function and attenuated the neuroinflammation, cell apoptosis, microglial activation and NF-κB pathway after DHCA. The in vitro studies showed that resveratrol had similar neuroprotective effect in hypothermic OGD model. Importantly, we also found that the modulation of TRAF6 and RIP1 ubiquitination by A20 was playing a pivotal role in relation to the mechanism of resveratrol inhibiting NF-κB pathway. Thus, resveratrol expands the horizons for exploring treatment tactics to avert or restrict brain injury and related neurocognitive obstacles after DHCA.

3. J Surg Res. 2019 Dec 23;248:90-97. doi: 10.1016/j.jss.2019.11.028. [Epub ahead of print]
Differing Resuscitation With Aortic Occlusion in a Swine Junctional Hemorrhage Polytrauma Model.
Schechtman DW(1), Kauvar DS(2), De Guzman R(3), Polykratis IA(3), Prince MD(3), Kheirabadi BS(3), Dubick MA(3).
Abstract
BACKGROUND: Resuscitative endovascular balloon occlusion of the aorta (REBOA) and Abdominal Aortic and Junctional Tourniquet (AAJT) have received much attention in recent as methods for temporary control of junctional hemorrhage. Previous studies typically used the animal's shed blood for resuscitation. With current interest in moving REBOA to prehospital environment, this study aimed to evaluate the hemodynamic and metabolic responses to different resuscitation fluids used with these devices. METHODS: In swine (Sus scrofa), shock was induced using a controlled hemorrhage, femur fracture, and uncontrolled hemorrhage from the femoral artery. Infrarenal REBOA or AAJT was deployed for 60 min during which the arterial injury was repaired. Animals were resuscitated with 15 mL/kg of shed whole blood (SWB) or fresh frozen plasma (FFP) or 30 mL/kg of a balanced crystalloid (PlasmaLyte). RESULTS: Animals in the AAJT and REBOA groups did not show any measurable differences in hemodynamics, metabolic responses, or survival with AAJT or REBOA treatment; hence, the data are pooled and analyzed among the three resuscitative fluids. SWB, FFP, and PlasmaLyte groups did not have a difference in survival time or overall survival. The animals in the SWB and FFP groups maintained higher blood pressure after resuscitation, (P < 0.001) and required significantly less norepinephrine to maintain blood pressure than those in the PlasmaLyte group (P < 0.001). The PlasmaLyte resuscitation prolonged prothrombin time and decreased thromboelastography maximum amplitude. CONCLUSIONS: After 60 min, infrarenal REBOA or AAJT aortic occlusion SWB and FFP resuscitation provided better blood pressure support with half of the resuscitative volume of PlasmaLyte. Swine resuscitated with SWB and FFP also had a more favorable coagulation profile. These data suggest that whole blood or component therapy should be used for resuscitation in conjunction

with REBOA or AAJT, and administration of these fluids should be considered if prehospital device use is pursued.

4. Microcirculation. 2019 Dec 25. doi: 10.1111/micc.12604. [Epub ahead of print]
Conjunctival Microcirculation Is Associated with Cerebral Cortex Microcirculation in Post-Resuscitation Mild Hypothermia: A Rat Model.
Zhao S(1), Yang Z(2), Sun P(3), Wu X(4), Tang W(4), Shao F(5), Tang Z(5)(6).
Abstract
This study aimed to compare the changes in sublingual and conjunctival microcirculation occurring with cerebral cortex microcirculation changes during mild hypothermia in a rat model of cardiac arrest. Twenty-four rats were randomized into mild hypothermia (M) or normothermia (C) groups. Ventricular fibrillation was electrically induced and left untreated for 8 min, followed by 8 min of cardiopulmonary resuscitation. The core temperature in group M reduced to 33±0.5°C at 13 min after restoration of spontaneous circulation (ROSC) and was maintained for 8 h. In group C, the core temperature was maintained at 37±0.2°C. The hemodynamics and microcirculation in the sublingual region, bulbar conjunctiva, and cerebral cortex were measured at baseline and 1, 2, 3, 4, 6, and 8 h after ROSC. The M group showed significantly worse sublingual microcirculation at 6 h post-resuscitation. However, microcirculation in the conjunctiva and cerebral cortex at 3 h post-resuscitation were better in the M group. In the M group, microcirculation in the cerebral cortex was significantly correlated with that in the conjunctiva but not the sublingual microcirculation. Changes in conjunctival microcirculation are closely related to cerebral cortex microcirculation during mild hypothermia, indicating that cerebral cortex microcirculation could be monitored by measuring conjunctival microcirculation.

5. Shock. 2019 Dec 26. doi: 10.1097/SHK.0000000000001501. [Epub ahead of print]
Effect of Mild Hypothermia on the Diaphragmatic Microcirculation and Function in a Murine Cardiopulmonary Resuscitated Model.
Li SP(1), Zhou XL(1), Li Q(2), Zhao YQ(2), Zhao ZG(1), Zhao Y(1).
Abstract
OBJECTIVE: Diaphragm dysfunction often occurs in patients with prolonged mechanical ventilation (MV) after resuscitation. Mild hypothermia (MHT) is a classical treatment to improve the outcomes of cardiac arrest (CA), however, the effect of MHT on diaphragm function remains unclear. In the present study, we aim to investigate the effect of MHT on diaphragmatic microcirculation and function using a murine cardiopulmonary resuscitation model. METHODS: Thirty-two rats were randomly assigned into a resuscitation normothermia group (RNT), an intra-resuscitation hypothermia group (IRH), a post-resuscitation hypothermia group (PRH), or a sham control group. CA was induced by airway occlusion, and resuscitation was implemented by precordial compression and MV. The diaphragmatic microvascular blood flow velocity, diaphragmatic microcirculation flow index (MFI) and perfused vascular density (PVD) were measured. The diaphragm was then removed for in vitro contractile property examination and cross-sectional area measurement. The lipid peroxidation and superoxide dismutase (SOD) levels in the diaphragm were also assayed. RESULTS:
Either early or delayed MHT intervention did not improve the diaphragmatic microvascular blood flow velocity, MFI, and PVD, which were significantly decreased during prolonged MV after resuscitation. Compared with the RNT group, treatment with MHT increased the diaphragm contractility, fiber dimensions, and SOD levels and decreased diaphragm lipid peroxidation. A more significant change in these indices was observed in the IRH group compared with that in the PRH group. CONCLUSION: MHT preserves the diaphragm contractility and fiber dimensions and decreases oxidative stress but does not improve the microcirculatory blood supply during prolonged MV after resuscitation. Early MHT intervention is more efficient in preventing diaphragm dysfunction than delayed intervention after CA.

CASE REPORTS

1. A A Pract. 2019 Dec 12. doi: 10.1213/XAA.0000000000001153. [Epub ahead of print]

Lund University Cardiac Assist System Induced Liver Laceration and Anterior Cord Infarction After Cardiac Arrest: A Case Report.

Drew T(1), Blackstock A(2), Aron J(2).

Abstract

We describe a hepatic laceration and subsequent anterior spinal artery syndrome in a 21-year-old man, secondary to prolonged cardiopulmonary resuscitation with a Lund University Cardiac Assist System (LUCAS2) mechanical cardiac compression device. We briefly review the current literature pertaining to hepatic injury from trauma due to cardiopulmonary resuscitation. The etiology of the anterior spinal artery syndrome in this patient is discussed. This case highlights that intra-abdominal causes of hypotension should be considered in patients after a prolonged resuscitation attempt. Extending focused cardiac ultrasound to exclude intra-abdominal free fluid should be routinely considered in these patients.

2. Biochem Med (Zagreb). 2020 Feb 15;30(1):010802. doi: 10.11613/BM.2020.010802. Epub 2019 Dec 15.

An unconscious man with profound drug-induced hypoglycaemia.

Schiemsky T(1), Vundelinckx G(2), Croes K(3), Penders J(4), Desmet K(1), Pauwels S(1), Vermeersch P(1).

Abstract

INTRODUCTION: Hypoglycaemia has been reported as an unusual complication of tramadol use and in a few cases of tramadol poisoning, but the exact mechanism is not known. CASE DESCRIPTION: An ambulance crew was dispatched to an unconscious 46-year old man. A glucometer point-of-care measurement revealed a profound hypoglycaemia (1.9 mmol/L). Treatment with intravenous glucose was started and the patient was transported to the hospital. The patient had several episodes of pulseless electrical activity requiring cardiopulmonary resuscitation in the ambulance and upon arrival in the hospital. Despite continuous glucose infusion the hypoglycaemia was difficult to correct during the next few hours and the patient developed hypokalaemia. Further investigation to identify the cause of hypoglycaemia revealed that insulin and C-peptide were inappropriately raised. A toxicological investigation revealed the presence of tramadol and its metabolites in lethal concentrations. Also acetaminophen, ibuprofen and lormetazepam were present. Ethanol screening was negative (< 0.1 g/L) and no sulfonylurea were detected. The patient developed multiple organ failure, but eventually recovered. WHAT HAPPENED: The hypoglycaemia was caused by inappropriate stimulation of insulin secretion in a patient intoxicated with tramadol. The sudden hypokalaemia was caused by a massive intracellular shift of potassium in response to the hyperinsulinemia, triggered by the intravenous administration of glucose. MAIN LESSON: To our knowledge, we are the first to document a significant rise in endogenous insulin production in a hypoglycaemic patient presenting with tramadol intoxication. Our observation suggests that hyperinsulinemia could be the cause of the hypoglycaemia associated with tramadol use.

FREE FULL TEXT

3. Cardiol Young. 2019 Dec 20:1-4. doi: 10.1017/S1047951119002993. [Epub ahead of print]

Accelerated idioventricular rhythm resulting in torsades de pointes and cardiac arrest in a child: successfully cryoablated in left'coronary cusp.

Ergul Y(1), Kafali HC(1), Uysal F(2).

Abstract

Known as a benign arrhythmia and normally requiring no specific treatment, accelerated idioventricular rhythm can rarely degenerate to a life-threatening arrhythmia. Here, we present a child with left coronary cusp-originating accelerated idioventricular rhythm, degenerating into torsades de pointes and resulting in cardiac arrest, which was ablated with a cryocatheter. An 11-year-old boy, followed due to asymptomatic accelerated idioventricular rhythm before, was referred to our department because he had experienced an aborted cardiac arrest during sleep. He had been resuscitated for 5 minutes. Twenty-four-hour Holter-ECG revealed incessant accelerated idioventricular rhythm, consisting up to 90% of the whole record and two torsades de pointes attacks,

triggered by accelerated idioventricular rhythm-induced "R on T" phenomenon, and resulting in syncope and cardiac arrest. Transthoracic echocardiography revealed no structural cardiac defect but mild left ventricular systolic dysfunction with an ejection fraction of 45% and shortening fraction 23%. An electrophysiologic study was conducted, and accelerated idioventricular rhythm focus was mapped to left aortic coronary cusp. A cryocatheter with an 8-mm tip was preferred for successful ablation of the accelerated idioventricular rhythm focus, due to close neighbourhood to coronary ostium. The patient was discharged in 3 days without any premature ventricular contractions or accelerated idioventricular rhythm and with normalised cardiac functions. After 9 months on follow-up, he was still asymptomatic, without any premature ventricular contractions or accelerated idioventricular rhythm and with normal cardiac functions. Although the clinical course of accelerated idioventricular rhythm is known as benign, accelerated idioventricular rhythm can rarely degenerate to a life-threatening arrhythmia. In such cases, electrophysiologic study and catheter ablation are a good option in such cases with accelerated idioventricular rhythm for an ultimate cure.

4. Spinal Cord Ser Cases. 2019 Dec 12;5:100. doi: 10.1038/s41394-019-0247-z. eCollection 2019.

Cardiopulmonary arrest induced by atlantoaxial dislocation with subarachnoid hemorrhage: a case report and review of the literature.

Kageyama H(1), Kakumoto K(1), Yasuoka H(2), Arimoto H(1), Ohara Y(3).

Abstract

INTRODUCTION: Spinal cord injury (SCI) with atlantoaxial dislocation (AAD) is often fatal. We present the case of a resuscitated patient with AAD and traumatic subarachnoid hemorrhage (SAH) at the craniovertebral junction (CVJ). CASE PRESENTATION: We present the case of an 84-year-old man who suffered an observed cardiopulmonary arrest. Cardiopulmonary resuscitation was initiated and spontaneous circulation returned. In the emergency room, the patient's Glasgow Coma Scale was 3 (E1V1M1). No spontaneous respiration was noted. Neuroimaging revealed SAH at the CVJ. Contrast-enhanced computed tomography (CT) revealed a vessel running through the left C2/3 intervertebral foramen into the spinal canal. The ventral space of spinal cord revealed contrast enhancement. Angiography revealed extravasation from the spinal branch of the left vertebral artery, without venous filling. It did not appear to be a vascular malformation with an arteriovenous shunt, but rather a traumatic laceration of the artery. Plain CT and CT angiography suggested AAD. Magnetic resonance imaging revealed injury to the medulla oblongata and upper cervical spinal cord, with AAD and retrodental subligamentous hemorrhage. We embolized the branch of the left vertebral artery and performed a C1 laminectomy. The patient moved his extremities postoperatively. DISCUSSION: This was a case of injury to the medulla oblongata and upper cervical spinal cord due to AAD with SAH. This is the first report of resuscitated case of traumatic AAD with SAH in the CVJ. Traumatic AAD should be included in the differential diagnosis in case of SAH in CVJ, which may be misdiagnosed as intrinsic SAH.