

INVITED COMMENTARY / КОМЕНТАР ПО ПОЗИВУ

Application of ultrasound diagnostics in cardiopulmonary resuscitation – invited commentary

Predrag Romić

Serbian Medical Society, Section for Anaesthesiology, Intensive Care and Pain Therapy, Belgrade, Serbia



The paper titled “Application of ultrasound diagnostics in cardiopulmonary resuscitation” [1] represents one of review articles which analyze the possibility of ultrasound (US) application during cardiopulmonary resuscitation (CPR). Having performed resuscitation for several decades, I believe that this represents a minor CPR topic since it can be applied only while verifying consciousness during CPR (which is to be avoided) since there are less than 10 seconds available (what can be achieved in such a short time frame?). In addition, the real indications are present only in the posttraumatic heart arrest (tension pneumothorax and hypovolemia, but these conditions are easily recognized and countered by anesthesiologists).

Pulmonary thromboembolism (PTE) is confirmed by indirect US findings (“dilatation and hypokinesis of RV, tricuspid regurgitation, increased systolic pressure in RV < 60 mmHg, dilated non-collapsible right hollow vein”) – however, this can be useful only when the heart is functioning, and we are talking about heart arrest provoked by PTE. Hence, if the heart is beating, we cannot see the dilatation and hypokinesis of the right ventricle, tricuspid regurgitation, etc.

Consequently, the recommendation to the authors and everyone else who is planning on introducing urgent US during CPR is that this is only possible in intra-hospital CPR, when the patient is already admitted to intensive treatment. In fact, this is stated in the recommendations of the European Resuscitation Council, which emphasize the application of urgent US during advanced cardiac life support, most frequently used in the hospital setting [2].

The insistence on dividing CPR into extra-hospital CPR and intra-hospital CPR is quite significant and has been put to practice ever since the time of projects researching extra-hospital heart arrest, and especially since a large multicentric study of the World Health Organization titled WHO MONICA Project

(Multinational Monitoring of Trends and Determinants in Cardiovascular Disease) – the study conducted between 1980 and 1990 in 21 countries unequivocally showed that cardiac arrests which occurred in extra-hospital settings were generally caused by coronary disease and developed according to the ventricular fibrillation type, while intra-hospital cardiac arrests developed according to asystole and electric activities without a pulse (PEA – pulseless electric activity). One study has demonstrated cardiogenic etiology in 91.5% of 10,861 extra-hospital cardiac arrest cases taken care by emergency medical teams [3, 4].

Since then, resuscitators have been aware that these basic measures of CPR (external heart massage and artificial respiration) in an extra-hospital cardiac arrest only “buy some time,” and causal therapy, such as defibrillation, i.e. a countershock by electric current which interrupts ventricular fibrillation, is needed as soon as possible. At that time, automatic external defibrillators (AEDs) appeared. These devices independently analyze heart rhythm and decide when and if to perform defibrillation with the accuracy of > 98%, so that they can be used even by resuscitators who are not medical doctors. This represents the basis for the PAD (Public Access Defibrillation) program development as the objective of contemporary CPR, which also comprises a network of amateur-resuscitators equipped with AEDs at locations where a large number of people are likely to be [5, 6].

All of the aforementioned has been stated with the ultimate goal to emphasize the wish and willingness in contemporary CPR for the earliest possible application of defibrillation in extra-hospital cardiac arrests, which makes the practicality of US use in these conditions negligible. The only possibility is to apply this method intra-hospitally, but even then only during rare periods of consciousness verification in patients suffering from cardiac arrest.

Received • Примљено:
September 8, 2017

Accepted • Прихваћено:
September 27, 2017

Online first: October 3, 2017

REFERENCES

1. Anđelić S, Pavlović A, Trpković S, Šijački A, Jančićević A, Putniković B. Application of ultrasound diagnostics in cardiopulmonary resuscitation. *Srp Arh Celok Lek.* 2018; 146(5-6):323–9.
2. Neumar RW, Shuster M, Callaway CW, Gent LM, Atkins DL, Bhanji F, et al. Executive Summary 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation.* 2015; 132:S315–67.
3. Luepker RV. WHO MONICA project: what have we learned and where to go from here? *Public Health Reviews.* 2012; 33:373–96.
4. Rea TD, Cook AJ, Stiell IG, Powell J, Bigham B, Callaway CW, et al. Predicting survival after out-of-hospital cardiac arrest: Role of the Utstein data elements. *Ann Emerg Med.* 2010; 55(3):249–57.
5. Romić P, Jovanović K, Jovičević K. Značaj rane defibrilacije u kardiopulmonalnoj reanimaciji. *Anaesth Jugoslav.* 2002; 23(3-4):11–6.
6. Romić P, Jovanović K, Simeunović S, Milojković A. Program masovne defibrilacije u slučajevima netraumatskog srčanog zastoja (PAD Program). *ABC – Časopis Urgentne medicine,* 2005; 1(4):5–14.