

MODIFIED TWO-THUMB METHOD IS SUPERIOR TO THE STANDARD TWO-THUMB METHOD FOR ADMINISTERING CHEST COMPRESSIONS IN A MANIKIN MODEL OF NEONATAL RESUSCITATION

Tomasz Klosiewicz, Marek Dabrowski, Agata Dabrowska

Department of Medical Rescue, Chair of Emergency Medicine, Poznan University of Medical Sciences, Poznan, Poland
Polish Society of Medical Simulation, Poland

Disaster Emerg Med J 2018; 3(1): 38–39

Dear Editor,

Out-of-hospital cardiac arrest (OHCA) in childhood is often associated with death or poor neurological outcome [1]. The newest European Resuscitation Council (ERC) Guidelines for Cardiopulmonary Resuscitation (CPR) advise, that the lone rescuer should use the Two-Fingers Chest Compressions technique (TFCC) instead of the Two-Thumb encircling Hands Technique (TTHT), when performing CPR on an infant in cardiac arrest [2]. In the case when resuscitation is performed by two rescuers, many studies indicated the superiority of the TTHT technique over TFCC technique [3–6]. Although Jiang et al. [4] have recommended TTHT, even during lone-rescuer infant CPR. In the standard TTHT CPR technique, rescuer provides compressions with two thumbs, while the remaining fingers of both hands embrace the newborn's chest, thereby creating it's specific support. In the mTTHT CPR technique, the rescuer provides compressions with two thumbs pointing at right angles to the newborn's chest. As other researches suggest in this way, it is possible to obtain either optimal depth of chest compressions or it's complete recoil. However, each of the previously mentioned methods has its own advantages and disadvantages. In connection with the above, it is reasonable to look for new, even more efficient methods, which increase the quality of newborn chest compressions and thus increase the effectiveness of CPR. A manifestation of the above are numerous studies showing alternative methods of newborns and infants chest compressions [7, 8].

The aim of this study was to compare the modified by Smereka method of newborn chest compressions (mTTHT) [6] with the standard two-thumb method recommended by AHA 2015 Guidelines for resuscitation.

In our research we used the methodology developed by Smereka et al. [6]. We conducted a randomised, cross-over manikin study in the Poznan University of Medical Sciences Centre for Medical Simulation. In order to simulate a patient requiring CPR, the SimBaby manikin (Laerdal, Norway) was used. Fifty-four last year paramedic students were qualified for the study. Prior to the study, the participants underwent a training in resuscitation of a newborn, taking into account the use of both TFCC, TTHT and mTTHT techniques. The individuals performed 2-minute cycle of single rescuer newborn chest compressions. They were randomly assigned to TTHT or mTTHT group. During the study, we assessed the rate of compressions (chest compressions per minute ($CC \times \text{min}^{-1}$), depth of compressions (mm) and percentage of correctly performed chest relaxation. All parameters were analysed by software attached to the manikin. In addition, the participants were asked to indicate the method which they would prefer during real newborn resuscitation.

We found that the rate of chest compressions in TTHT group was $103 \pm 11 \text{ CC} \times \text{min}^{-1}$, while in mTTHT group — $105 \pm 12 \text{ CC} \times \text{min}^{-1}$ ($p = 0.348$). The depth of compressions varied in both groups and amounted to $39 \pm 8 \text{ mm}$ and $40 \pm 5 \text{ mm}$ re-

ADDRESS FOR CORRESPONDENCE:

Marek Dabrowski, Department of Medical Rescue, Chair of Emergency Medicine, Poznan University of Medical Sciences, Poznan, Poland;
e-mail: maro.dabrowski@gmail.com

spectively ($p = 0.065$). The percent of correctly performed chest recoil in TTHT group was $65 \pm 16\%$, and in mTTHT group — $86 \pm 21\%$ ($p = 0.002$). Thirty-seven individuals, which accounted for 68.5% of the study group, chose mTTHT as the preferred method of neonatal resuscitation.

Summarising, in our simulation study, mTTHT is comparable to the TTHT method in relation to the frequency and depth of compressions. However, better percentage of correctly performed chest relaxation was achieved when using the mTTHT method.

Conflict of interest: None declared.

REFERENCES

1. Young KD, Gausche-Hill M, McClung CD, et al. A prospective, population-based study of the epidemiology and outcome of out-of-hospital pediatric cardiopulmonary arrest. *Pediatrics*. 2004; 114(1): 157–164, indexed in Pubmed: [15231922](#).
2. Wyllie J, Bruinenberg J, Roehr CC, et al. European Resuscitation Council Guidelines for Resuscitation 2015: Section 7. Resuscitation and support of transition of babies at birth. *Resuscitation*. 2015; 95: 249–263, doi: [10.1016/j.resuscitation.2015.07.029](#), indexed in Pubmed: [26477415](#).
3. Menegazzi JJ, Auble TE, Nicklas KA, et al. Two-thumb versus two-finger chest compression during CRP in a swine infant model of cardiac arrest. *Ann Emerg Med*. 1993; 22(2): 240–243, indexed in Pubmed: [8427439](#).
4. Jiang J, Zou Y, Shi W, et al. Two-thumb-encircling hands technique is more advisable than 2-finger technique when lone rescuer performs cardiopulmonary resuscitation on infant manikin. *Am J Emerg Med*. 2015; 33(4): 531–534, doi: [10.1016/j.ajem.2015.01.025](#), indexed in Pubmed: [25667159](#).
5. Smereka J, Bielski K, Ladny JR, et al. Evaluation of a newly developed infant chest compression technique: A randomized crossover manikin trial. *Medicine (Baltimore)*. 2017; 96(14): e5915, doi: [10.1097/MD.0000000000005915](#), indexed in Pubmed: [28383397](#).
6. Smereka J, Szarpak L, Smereka A, et al. Evaluation of new two-thumb chest compression technique for infant CPR performed by novice physicians. A randomized, crossover, manikin trial. *Am J Emerg Med*. 2017; 35(4): 604–609, doi: [10.1016/j.ajem.2016.12.045](#), indexed in Pubmed: [28040386](#).
7. Smereka J, Szarpak L, Rodríguez-Núñez A, et al. A randomized comparison of three chest compression techniques and associated hemodynamic effect during infant CPR: A randomized manikin study. *Am J Emerg Med*. 2017; 35(10): 1420–1425, doi: [10.1016/j.ajem.2017.04.024](#), indexed in Pubmed: [28433454](#).
8. Smereka J, Kasiński M, Smereka A, et al. The quality of a newly developed infant chest compression method applied by paramedics: a randomised crossover manikin trial. *Kardiol Pol*. 2017; 75(6): 589–595, doi: [10.5603/KPa2017.0015](#), indexed in Pubmed: [28150278](#).