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Letter to the Editor:

Chest Compression Rate, Rescuer's Fatigue and Patient's Survival

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Dear Editor-in-Chief,

I have read the report by Hwang et al. (1) with great interest. Although there were no significant differences between the outcomes of 100/min chest compression rate (CCR) group and 120/min CCR group, it was worthy of notice that the one-month survival rate of 100/min CCR group was almost twice compared to the 120/min CCR group.

Although several studies were reported that excessive CCR was associated with low quality of cardiopulmonary resuscitation (CPR) and low survival to hospital discharge (2,3), the recommended CCR was changed from at least 100/min in the 2010 CPR guidelines to at a rate of 100/min to 120/min in the 2015 CPR guidelines (4,5). However, the recommended CCR was originally at a rate of about 100/min in 2005 CPR guidelines (6). Therefore, the results of Hwang et al. study (1)'s might be the evidence to change back the recommended CCR to that of 2005 CPR guidelines.

Although the relationships between the rescuer's fatigue and CCR have not been confirmed yet, I expect that increasing CCR might lead to worsening rescuer's fatigue with several reasons. First, the chest compression depth decreased with increasing CCR in the simulation study (7). Second, the chest compression depth is strongly related to the accumulated rescuer's fatigue (8,9).

If it was confirmed that the rescuer's fatigue was accumulated more quickly in 120/min CCR compared with 100/min CCR, the superiority of 100/min CCR might be clear. However, rescuer's fatigues were not measured in this report. In addition, the mean compression depth of the 100/min CCR group was not deeper than that of the 120/min CCR group (1).

The study group measured the chest compression depth by using accelerometer device (Q-CPR, Philips Healthcare, Seattle, WA, USA). The accelerometer device could not measure chest compression depth accurately when CPR was performed on a bed (10). In addition, the measured chest compression depths with accelerometer device might be different according to the surface conditions (e.g. types of mattress, whether the backboard is used or not) (10). However, the authors did not describe detailed conditions of CPR beds or mattresses and whether they used same bed/mattress settings or not. Therefore, the reliability of the measured chest compression depths was low.

The study group measured chest compression fractions (CCF) and end-tidal carbon dioxide levels too. The CCF of the 100/min group was significantly higher than that of the 120/min group. It might be another evidence of supporting the superiority of 100/min CCR because higher CCF was reported to be an independent predictor of better survival (11). However, higher CCF could not be the strong evidence because several opposite results were published recently (12,13).

Despite several weak points such as measuring device, different bed/mattress setting (CPR environments), many confounders caused by including out-of-hospital cardiac arrest patients and lacking number of patients as indicated by authors, Hwang et al. report is very interesting and will be a clue to prove the superiority of 100/min CCR. Follow up randomized controlled trials should be warranted including large number of sample size to confirm the superiority of 100/min CCR. For example, 716 patients will be needed under the conditions; two-sided significance level of 0.05, statistical power of 80%, setting the primary outcome variable with one-month survival rate (12.5% vs. 6.4%), allocation ratio of 1:1 and using sample size calculator under two parallel-sample proportions (14).

DISCLOSURE

The author has no potential conflict of interest to disclose.

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