Resuscitation 115 (2017) 173–177

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Does lying in the recovery position increase the likelihood of not delivering cardiopulmonary resuscitation?

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ARTICLE INFO

Article history:
Received 22 September 2016
Received in revised form 12 February 2017
Accepted 3 March 2017

Keywords:
Recovery position
CPR
Breathing assessment
Out-of-hospital cardiac arrest
Head tilt and chin lift

ABSTRACT

Background: Resuscitation guidelines endorse unconscious and normally breathing out-of-hospital victims to be placed in the recovery position to secure airway patency, but recently a debate has been opened as to whether the recovery position threatens the cardiac arrest victim's safety assessment and delays the start of cardiopulmonary resuscitation.
Aim: To compare the assessment of the victim's breathing arrest while placed in the recovery position versus maintaining an open airway with the continuous head tilt and chin lift technique to know whether the recovery position delays the cardiac arrest victim's assessment and the start of cardiopulmonary resuscitation.
Methods: Basic life support-trained university students were randomly divided into two groups: one received a standardized cardiopulmonary resuscitation refresher course including the recovery position and the other received a modified cardiopulmonary resuscitation course using continuous head tilt and chin lift for unconscious and spontaneously breathing patients. A human simulation test to evaluate the victim's breathing assessment was performed a week later.
Result: In total, 59 participants with an average age of 21.9 years were included. Only 14 of 27 (51.85%) students in the recovery position group versus 23 of 28 (82.14%) in the head tilt and chin lift group $p = 0.006$ (OR 6.571) detected breathing arrest within 2 min.
Conclusion: The recovery position hindered breathing assessment, delayed breathing arrest identification and the initiation of cardiac compressions, and significantly increased the likelihood of not starting cardiopulmonary resuscitation when compared to the results shown when the continuous head tilt and chin lift technique was used.

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Introduction

Out-of-hospital cardiac arrest (OHCA) is one of the most important causes of death in Europe[1–3]. The incidence of cardiopulmonary resuscitation (CPR) attempts ranges from 19.0 to 104.0 per 100,000 people per year[4], with an overall survival of at least 30 days for 10.38%. Early recognition and prompt initiation of bystander CPR are critical for successful defibrillation[5–8] and to improve the victim's outcome and thus doubling or quadrupling a victim's chances of survival[9–12].

Breathing assessment is a fundamental step in recognizing OHCA and was included in the basic life support (BLS) section of current CPR guidelines[13], substituting pulse assessment, with the aim of achieving a higher OHCA detection rate and greater likelihood of bystanders delivering cardiac compressions. However, breathing assessment can be quite challenging[14,15] when it is carried out in the first few minutes of witnessed OHCA: the victim may appear to be breathing normally during the first minute[16] but agonal breathing may appear after that and could last for up to approximately the sixth[16] or the ninth minute[17]. After several minutes, these breathing patterns become slower and more erratic and culminate in breathing arrest. Agonal breathing can be present in up to 59.7% of OHCA[17–19] and is difficult to distinguish from spontaneous breathing; 21% of lay persons could not determine whether the victim was

Abbreviations: CPR, cardiopulmonary resuscitation; OHCA, out-of-hospital cardiac arrest; BLS, basic life support; HTCL, head tilt and chin lift technique; RP, recovery position; EMS, emergency medical services; ERC, European resuscitation guidelines.

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http://dx.doi.org/10.1016/j.resuscitation.2017.03.008
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breathing normally[19]. Breathing assessment can be further complicated in the case of comatose victims because of a variety of possible circumstances (drug or alcohol overdose, seizure, syncope, cerebrovascular event, and hypoglycemia), which can resemble agonal movements, and according to studies, up to 45% of the victims evaluated by the dispatcher as OHCA were not in arrest[20]. Therefore, it is necessary to constantly monitor the victim's breathing during these first minutes, and if the witness is not certain that the victim is breathing normally, then CPR must be started.

Current CPR guidelines[13] endorse the head tilt and chin lift (HTCL) technique as the ideal way to initially assess breathing and recovery position (RP)[13,21] as the recommended position to place out-of-hospital unresponsive and normally breathing victims in because of the lack of demonstrated associated risk. However, the evidence available to support this is weak and mainly historical[22–32], from before the development of mobile telephony, when the person who had to alert the emergency medical services (EMS) was forced to abandon the victim to request help. Nowadays, with the spread of mobile phone lines[33,34] around the world (in 2014 the number of mobile phones equaled the world's population), the situation has changed. Until today, no study reporting the improvement of a victim's chances of survival with the use of RP has been published[35,36]. However, a letter[37] highlighting a series of cases in which OHCA victims were initially placed in RP by bystanders and the subsequent loss of breathing was not detected and no CPR was initiated by witnesses opened a debate[38] whether RP threatens the assessment of a cardiac arrest victim in OHCA.

The aim of the study was to compare the victim's breathing assessment and arrest detection when placed in RP versus placed on his back maintaining an open airway with the HTCL technique to find whether RP hinders the cardiac arrest victim's assessment and delays the start of CPR.

Methods

Design, sample, and setting

Sample

Students from the Faculty of Teacher Training at the University of Santiago de Compostela, Lugo, trained in BLS were included in this study. As inclusion criteria, the students had to be trained in CPR according to the European Resuscitation Council (ERC) Guidelines for Resuscitation 2015 (Fig. 1 and Table 1).

Their participation in the study was voluntary and selfless. The research project was approved by the ethical committee of University of Santiago de Compostela, respecting the ethical principles of the Helsinki Convention. Each participant signed informed consent, authorizing the transfer of his data for this study.

Study design

The participants were randomly divided into two groups and were given a refresher BLS training course, including the use of the HTCL maneuver for opening the airway to check breathing according to current CPR Guidelines[13] but with one remarkable difference: the students in the first group were taught to place the unconscious and normally breathing victim in the RP and then to check breathing regularly. The students in the second group received the same training but were taught to maintain an open airway with the HTLC technique in the case of an unconscious and normally breathing victim. The victim's back was on the floor and the student was at the victim's side according to the current CPR guidelines' Picture[13], just as the skill was taught for opening the airway during the first assessment, and the student constantly monitored the victim's breathing. Both the courses highlighted the importance of continuously monitoring the victim's breathing and to start CPR if they were not certain if the victim was breathing normally. They were also informed of the challenge involved in assessing breathing[14], and the most common characteristics that appear in agonal breathing were also explained[15]. Both courses also included an on manikin dispatcher-assisted CPR simulation so that participants would always know that they could request dispatcher assistance at any time.

One week after the BLS refresher course, a study was conducted in two identical isolated rooms at the Faculty of Teacher Training in Lugo (Spain). The participants were told that the purpose of the study was to evaluate cardiac arrest situations in a simulation performed by real actors who played the victims.

The students came into the room where the simulation was done one by one. An actor, an observer, and a third person who was responsible for the actor's safety were inside the room. The actors were expert scuba divers who participated in competitive prolonged apnea diving. They had previously been instructed on how to simulate normal and agonal breathing. The observer assessed the participants and recorded the times. The third person kept the participants from delivering cardiac compressions to scuba diver. The participants' intention of delivering chest compressions was taken as "chest compressions start." A fully equipped advanced life support team of three people (physician, nurse, and paramedic) was on stand-by in another room throughout the simulation.

The simulation went as follows: The actor suffered an episode of severe chest pain followed by a sharp fall to the ground and unconsciousness, witnessed by the participant. The actor was breathing normally at the time of the fall[16], but his breathing patterns became progressively slower and deteriorated over 2 min and concluded in breathing arrest. After breathing arrest, the actor remained in apnea for another 2 min or until the recognition of the situation by the participant.

The participants were provided with a smartphone when they came into the room. The victim's fall to the ground was taken as the start time. The student then phoned the EMS number (061) and performed the different steps of the adult BLS sequence. The simulation ended 4 min after the start time or at the time the participants attempted to deliver chest compressions.

Data analysis

The primary objective of this study was to assess the association between the victim's position, RP and HTCL, and the percentage of participants who recognized abnormal breathing or breathing arrest. The *odds ratio* (OR) (95% confident interval (CI)) and $\chi 2$ was calculated to look for statistically significant differences. The chosen level of significance was 0.05. The Student's *t*-test for independent samples was conducted to see whether there was a significant difference between recognition percentages and mean times.

Results

Fifty-nine student volunteers aged 21–31 ($M = 21.94$; SD = 1.82) were enrolled. Of them, 19 (32.2%) were male and 40 (67.8%) female. All the participants assessed the victim before calling the EMS number. None of them requested dispatcher assistance to guide the assessment.

After the victim's initial assessment, four (8.48%) participants, two from each group, who concluded the victim to be unconscious and breathing abnormally, started cardiac compressions. This implied the end of the simulation. Fifty-five (91.52%) participants evaluated the victim's state as unresponsive but normally breathing; 27 placed the victim in RP and 28 in HTCL. Out of the 27 participants that placed the victim in RP, 14 (51.8%) detected

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