Cardiopulmonary Resuscitation in the Prone Position: A Good Option for Patients With COVID-19

To the Editor

Prone positioning of intubated patients suffering from pneumonia improves ventilation-perfusion matching, recruits collapsed alveoli, provides a more uniform distribution of tidal volume through improved chest wall mechanics, and may decrease mortality in more severely hypoxemic patients. Guérin et al[1] enrolled 466 patients with moderate-to-severe ARDS (the arterial oxygen tension [PaO_2]/fractional inspired oxygen [FiO_2] ratio < 150 mm Hg) and reported a significant mortality benefit in the prone positioning group (hazard ratio [HR], 0.39; 95% confidence interval [CI], 0.25–0.63; $P < .001$).[1] Patients infected with coronavirus disease 2019 (COVID-19) are at high risk for developing severe pneumonia and subsequent ARDS. Prone positioning is therefore a common strategy in their intensive care as well.

Recent reports indicate based on multiple pathologies COVID-19 patients are at higher risk for cardiac arrest.[2] Immediate initiation of cardiopulmonary resuscitation (CPR), including chest compressions, are crucial but challenging when the patient is prone. Performance of CPR in the prone position is uncommon, but there are several reports of CPR in patients in the prone position having spine surgery (Supplemental Digital Content, Table 1, http://links.lww.com/AA/D134).

A reasonable question is whether a prone patient with cardiac arrest be turned supine before initiating CPR or remain in the prone position. Turning a patient is time-consuming, requires multiple individuals and therefore multiple exposures, and increases the risk for adverse events like endotracheal tube displacement and disconnection of arterial and venous lines. In the prone position, the proper hand positioning is important. Kwon et al[3] reported that the largest left ventricular cross-sectional area is 0–2 vertebral segments below the inferior angle of the scapula in at least 86% of patients in patients positioned prone.

Two separate studies investigated the efficacy of CPR in the patients positioned prone. Wei et al[4] reported that CPR in prone position compared to the supine position was associated with higher mean systolic blood pressure (SBP; 79 ± 20 vs 55 ± 20 mm Hg) and higher diastolic blood pressure (DBP; 17 ± 10 and 13 ± 7 mm Hg, respectively). The analysis indicates that in the prone position, SBP was statistically significantly higher than in supine position (mean difference [MD] = 24.00; 95% CI, 5.79–42.21; $P = .010$), while in DBP, the difference was not statistically significant (MD = 4.00; 95% CI, −3.65 to 11.65; $P = .31$). Mazer et el[5] reported the advantage of prone position over the supine position in the context of SBP (72 vs 48 mm Hg; $P < .05$; mean arterial pressure (46 vs 32 mm Hg; $P < .05$) and DBP (34 vs 24 mm Hg; $P > .05$).

During CPR in prone position, endotracheal/tracheostomy tube dislodgement can occur and the patient may then need to be turned for intubation. Injuries to ribs, spine, scapula, clavicles, or eyeballs and shoulder dislocation are possible. The effectiveness of CPR is affected by the depth of chest compressions and therefore it is still recommended to place the patient on a hard surface or to place a hard board under the patient. ARDS patients are placed in prone position for several hours, while COVID-19 ARDS patients for even 12–18 hours or more. The prone position is also used in patients undergoing noninvasive ventilation, in spontaneously breathing nonintubated patients, for example, due to refractory hypoxemia in acute respiratory failure including lung transplantation.[6]

In summary, CPR in the prone position seems to be a reliable method to provide CPR in patients positioned prone.

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Funding: Supported by the ERC Research NET and Polish Society of Disaster Medicine.

Conflicts of Interests: B. W. Böttiger is European Resuscitation Council (ERC) Board Director Science and Research; Chairman of the German Resuscitation Council (GRC); member of the Advanced Life Support (ALS) Task Force of the International Liaison Committee on Resuscitation, member of the executive committee of the German Interdisciplinary Association for Intensive and Emergency Medicine (Deutsche Interdisziplinäre Vereinigung für Intensiv und Notfallmedizin [DIVI]); associated editor of the *European Journal of Anaesthesiology (EJA)*, co-editor of *Resuscitation*; editor of the journal *Notfall + Rettungsmedizin*. He received professional fees for lectures from the following companies: Medupdate GmbH, "Forum für medizinische Fortbildung (FomF)," Baxalta Deutschland GmbH, Bayer Vital GmbH, ZOLL Medical Deutschland GmbH, C. R. Bard GmbH, GS Elektromedizinische Geräte G. Stemple GmbH.

The remaining authors declare no conflicts of interest.

Supplemental digital content is available for this article. Direct URL citations appear in the printed text and are provided in the HTML and PDF versions of this article on the journal's website (www.anesthesia-analgesia.org).

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DOI: 10.1213/ANE.0000000000005049