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 [PaO₂]/fractional inspired oxygen [FiO₂] 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 positions 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 al.5 reported the advantage of prone position over the supine position in the context of SBP (72 vs 48 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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Medical Ethics Versus Health Care Workers’ Rights: Fight-or-Flee Response

To the Editor

I read with great interest an article by Bong1 on coronavirus disease 2019 (COVID-19) impact on low- and middle-income countries (LMICs). This article deals with the several health care problems faced in LMICs, and the authors have provided solutions to overcome it.

Before I share my views, I would like to introduce my current workplace. I am working as an Anesthesiologist in a tertiary care hospital situated in the eastern part of Nepal. My country is sandwiched between 2 big giants, China and India. While China has flattened the COVID-19 curve, India is between stages 2 and 3 of the coronavirus pandemic. As of April 17, 2020, Nepal has reported 16 confirmed cases (14 active and 2 recovered), with no casualty. The Government of Nepal imposed the lockdown timely to combat COVID-19 spread and is planning to extend the ongoing lockdown. Although social distancing limits the virus spread, it is not the only solution. Moreover, with a porous border with India, there is a high chance of importing the virus. Perhaps, we are just 1 month behind from where India is in the current situation.

This has caused fear, panic, and anxiety among us—the frontline health care providers. It is the same feeling before doing the bungee jump. A recent survey revealed that nearly half of the health care workers treating COVID-19 patients experienced symptoms of depression, while about one-third of them suffered from insomnia.2 This report highlights the importance of psychological well-being of health care workers involved during the COVID-19 tsunami. Unfortunately, mental health is often neglected in our part of the world. To overcome the mental stress, the government should provide social securities and incentives to health care workers, and moral support to reassure how important we are to the country and the sacrifices we are doing at this crisis. At the individual level, one needs to incorporate relaxation techniques and positive coping behaviors, eat regular and balanced meals, maintain sleep hygiene, and stay connected with closed ones. Ultimately, this would help to strengthen our resilience to combat the life-threatening situation.

One of the reasons on how South Korea curbed the COVID-19 spread was due to its excellent coordination between public and private hospitals. Private hospitals contribute a major role in the health care system of any LMICs. Survey studies from Nepal showed that: private sector (hospitals and medical colleges) owns two-third of the hospital beds; roughly half of country’s doctors work in a private hospital; majority of patients with acute illness seek care in the private hospital; and out of 480 intensive care unit (ICU) beds available in the capital city of Nepal, 330 beds belong to the private sector.3,4 Therefore, the government should collaborate with the private hospital sector to fight against the COVID-19.

The other issue is related to the availability of personal-protective equipment (PPEs). All guidelines recommend PPEs compulsory to the anesthesiologist managing COVID-19 patients. But access to PPEs is far from the reality. For example, according to the COVID-19 rapid response team of our hospital, at present, we have only 140 complete set of PPEs. These PPEs were provided by the Government of Nepal and donors from nongovernmental organizations. The authors correctly pointed out that in today’s crisis, LMICs heavily rely on financial assistance from affluent countries and international organizations.1 While, at this moment, when the rich countries are struggling to get the PPEs for their own health care workers, we will only have a handful of these PPEs by the time it reaches our place. One solution to this is to encourage the local entrepreneurs, innovators, and private sectors to produce PPEs. The government of Nepal has already granted the permission to National Innovation Center to produce PPEs.5 Although these protective gear might not be of American or European standards, at least, they provide a sense of safety for us. Also, for the decontamination of used PPEs on large scale, the LMICs should develop innovative techniques, such as hydrogen peroxide vapor sterilization. The reprocessing of PPEs followed by its reuse would help us to minimize the shortage.

Finally, the current scenario reminds me of my country’s history on how the “Gurkhas” with a curved knife weapon, “Khukuri,” fought against the well-equipped forces of the British East India Company.6 History has repeated again. By the time my opinion gets published in Anesthesia & Analgesia, I will be on the battlefield with “Khukuri” in my hand fighting against the AK-47 (ie, COVID-19 virus).

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REFERENCES
1. Guérin C, Reignier J, Richard JC, et al; PROSEVA Study Group. Prone positioning in severe acute respiratory distress syndrome. N Engl J Med. 2013;368:2159–2168.
2. Shao F, Xu S, Ma X, et al. In-hospital cardiac arrest outcomes among patients with COVID-19 pneumonia in Wuhan, China. Resuscitation. 2020;151:18–23.
3. Kwon MJ, Kim EH, Song JK, Lee JH, Kim HS, Kim JT. Optimizing prone cardiopulmonary resuscitation: identifying the vertebral level correlating with the largest left ventricle cross-sectional area via computed tomography scan. Anesth Analg. 2017;124:520–523.
4. Wei J, Tung D, Sue SH, Wu SV, Chuang YC, Chang CY. Cardiopulmonary resuscitation in prone position: a simplified method for outpatients. J Chin Med Assoc. 2006;69:202–206.
5. Mazer SP, Weisfeldt M, Bai D, et al. Reverse CPR: a pilot study of CPR in the prone position. Resuscitation. 2003;57:279–285.
6. Scaravilli V, Grasselli G, Castagna L, et al. Prone positioning improves oxygenation in spontaneously breathing nonintubated patients with hypoxemic acute respiratory failure: a retrospective study. J Crit Care. 2015;30:1390–1394.

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