Journal of Anesthesia (2024) 38:719–720
https://doi.org/10.1007/s00540-024-03363-z

LETTER TO THE EDITOR

Reply to the letter

Duk Kyung Kim[1]

Received: 3 June 2024 / Accepted: 4 June 2024 / Published online: 4 July 2024

Keywords Hypothermia · Oxygen saturation · Oximetry

To the Editor:

We thank Dr. Mengjun Wu and Bin Shi for their constructive comments regarding my article [1]. They questioned about the higher stability of nasal septum pulse oxygen saturation (SpO_2) monitoring than finger SpO_2 monitoring to hypothermia.

Any situation that diminished arterial pulsation in the peripheral tissues may interfere with pulse oximetry and the accuracy of the SpO_2. This includes low cardiac output, hypotension, vasoconstriction, and hypothermia. Core or peripheral hypothermia causes two major problems in a reliability of SpO_2 monitoring; erroneous or unobtainable SpO_2 readings.

Hypothermia can lead to a slight overestimation of arterial oxygen saturation (SaO_2) and delayed recognition of acute hypoxemia in SpO_2 monitoring. This is related to increased concentrations of carboxyhemoglobin (possibly secondary to hemolysis) [2]. When considering that hypothermia reduces tissue oxygen availability due to a leftward shift of the hemoglobin dissociation curve, these phenomenon may have a significant clinical meaning, especially during hypoxemic condition.

Though the reliability profiles are somewhat different among pulse oximeter models and measurement sites, the lowest reliable core and peripheral (*i.e.*, measurement site) temperatures are known to be less than 35.0 °C and less than 24.0 or 27 °C, respectively [2, 3]. Of course, a substantial inter-subject variability is existed in these cutoff values.

In our study, only one subject was hypothermic enough to reach the cutoff values at the finger SpO_2 monitoring site, whereas 5 subjects corresponded to the cutoff values of core temperature. Thus, our study might be insufficient to confirm the higher stability of nasal septum SpO_2 monitoring than finger SpO_2 monitoring to hypothermia. However, as showed in our study, it is evident that the nasal septum preserves the temperature more than the finger during general anesthesia.

In this study, we considered a pulse oximetry monitoring failure as a more important limitation than a slight overestimation. Though our study were not powered for this variable, nasal septal sensor functioned well continuously in all cases. However, finger sensor failed two or three times in two cases due to hypothermia.

Collectively, it may be reasonable to suggest that nasal septum pulse oximetry can be an alternative option to finger pulse oximetry in conditions of hypothermia. To confirm our suggestion, further study will be necessary in a setting of cardiac surgery using moderate-to-deep hypothermia.

Funding The authors receive no financial support from any pharmaceutical or medical devices companies.

Declarations

Conflict of interest The author declares no conflicts of interest associated with this manuscript.

Ethical approval Ethical approval statement because this manuscript only conveyed the author's opinion, approval process was exempted by the Institutional Review Board of Samsung medical Center.

This reply refers to the comment available online at https://doi.org/10.1007/s00540-024-03353-1.

✉ Duk Kyung Kim
dikei@hanmail.net

[1] Department of Anesthesiology and Pain Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, 81 Irwon-ro, Gangnam-gu, Seoul 06351, Republic of Korea

References

1. Oh Y, Kim DK, Ryu DK, Choi JW. Evaluation of pulse oximeter at the nasal septum during general anesthesia: a comparison with finger oximeter. J Anesth. 2024;38:364–70.
2. Pälve H, Vuori A. Pulse oximetry during low cardiac output and hypothermia states immediately after open heart surgery. Crit Care Med. 1989;17:66–9.
3. Carter BG, Wiwczaruk D, Hochmann M, Osborne A, Henning R. Performance of transcutaneous PCO_2 and pulse oximetry monitors in newborns and infants after cardiac surgery. Anaesth Intensive Care. 2002;29:260–5.