

LETTER TO THE EDITOR

Open Access



Starting induction of general anesthesia after complete preparation for emergency surgical drainage in all patients with cardiac tamponade

Keisuke Yoshida^{1,2*} , Shiori Tanaka^{1,2} and Kazuhiro Watanabe¹

To the Editor,

Induction of general anesthesia (GA) in patients with cardiac tamponade (CT) can cause significant risks (Stanley and Weidauer 1973). Miller's anesthesia emphasizes the importance of optimizing preload, avoiding myocardial depression, and preventing bradycardia (Nussmeier et al. 2015). However, there are few specific descriptions about what kind of precautions, other than drugs and infusions, should be taken.

We here report a 61-year-old female (height 160 cm, weight 61 kg) who underwent aortic arch replacement for acute type A aortic dissection. Her blood pressure (BP) had gradually decreased on postoperative day 19, and both computed tomography and transthoracic echocardiography showed 30-mm pericardial effusion. Although a diagnosis of CT was made, percutaneous pericardiocentesis was difficult due to the effusion site. Therefore, emergency surgical drainage was scheduled. When the patient arrived at the operating room, her BP was 116/50 mmHg, heart rate was 75 bpm with dopamine 4.1 µg/kg/min, and consciousness level was E1V1M4 on the Glasgow Coma Scale. After the placement of standard monitors and initiation of monitoring continuous arterial BP, administration of noradrenaline 0.06 µg/kg/min was started, and about 500 mL of Ringer's solution was administered rapidly. Then, GA was induced with ketamine 50 mg, fentanyl 200 µg, and rocuronium 50 mg. The patient's BP then began to drop sharply; therefore, tracheal intubation and mechanical

ventilation with low tidal volume were performed immediately. The patient developed pulseless electrical activity 3 min after intubation, and an emergency left thoracotomy for surgical drainage was performed. Serous pericardial fluid was drained 8 min after intubation. She developed asystole during the course; thus, adrenaline 1 mg was administered three times with open-chest cardiac massage. Due to the transition to ventricular fibrillation, percutaneous defibrillation was performed three times, and the return of spontaneous circulation was confirmed 13 min after intubation. Postoperatively, target temperature management (36.0 °C) was conducted for 48 h in the intensive care unit (ICU). Twenty days after surgical drainage, the patient was discharged from the ICU with cerebral performance category 1.

The major cause of cardiac arrest in the present case was considered to be a decreased pressure gradient for venous return, which was caused by the disappearance of spontaneous breathing (Perel 2017), which induced an extreme decrease of cardiac output. In addition, positive pressure ventilation raises intrathoracic pressure and prevents ventricular filling (Appleton et al. 1988). Although preserving spontaneous breathing is also an option when GA is required for a patient with CT (Nussmeier et al. 2015), we planned one-lung ventilation in the present case and thus used rocuronium. It is also an option to establish venoarterial extracorporeal membrane oxygenation (VA-ECMO) support (Formica et al. 2018) prior to induction of GA. However, the procedure is invasive, and it is not always practical to prepare VA-ECMO in cases of CT.

In the present case, we took a few minutes to start emergency drainage. Thus, through this experience, we propose being prepared for emergency drainage at any

* Correspondence: kei-y7of@fmu.ac.jp

¹Department of Anesthesiology, Aizu Chuo Hospital, 1-1, Tsuruga-machi, Aizuwakamatsu, Fukushima 965-8611, Japan

²Department of Anesthesiology, Fukushima Medical University, 1, Hikariga-oka, Fukushima, Fukushima 960-1295, Japan

time (disinfecting and draping the surgical field, and preparing the necessary equipment) prior to induction of GA in all patients with acute/chronic CT, regardless of the amount of pericardial effusion. We believe that performing this simple preparation can contribute to shortening the time needed to empty the pericardial sac when severe hemodynamic changes are caused during the induction of GA.

Abbreviations

GA: General anesthesia; CT: Cardiac tamponade; BP: Blood pressure; ICU: Intensive care unit; VA-ECMO: Venoarterial extracorporeal membrane oxygenation

Acknowledgements

The authors would like to thank the Scientific English Editing Section of Fukushima Medical University for their work on this manuscript.

Authors' contributions

KY conducted the perioperative management, managed the anesthetic care, and prepared the manuscript. ST conducted the perioperative management. KW managed the anesthetic care and helped to draft the manuscript. All authors have read and approved the final manuscript.

Funding

None.

Availability of data and materials

Not applicable.

Declarations

Ethics approval and consent to participate

In our institution, Institutional Review Board approval is not required for a case report.

Consent for publication

Written informed consent for publication of this case report was obtained from the family of the patient.

Competing interests

The authors declare that they have no competing interests.

Received: 19 August 2021 Accepted: 12 October 2021

Published online: 30 October 2021

References

- Appleton CP, Hatle LK, Popp RL (1988) Cardiac tamponade and pericardial effusion: respiratory variation in transvalvular flow velocities studied by Doppler echocardiography. *J Am Coll Cardiol*. 11(5):1020–1030. [https://doi.org/10.1016/S0735-1097\(98\)90060-2](https://doi.org/10.1016/S0735-1097(98)90060-2)
- Formica F, Mariani S, Singh G, D'Alessandro S, Messina LA, Jones N, Bamodu OA, Sangalli F, Paolini G (2018) Postinfarction left ventricular free wall rupture: a 17-year single-centre experience. *Eur J Cardiothorac Surg* 53(1):150–156. <https://doi.org/10.1093/ejcts/ezx271>
- Nussmeier NA, Sarwar MF, Searlees BE et al (2015) Anesthesia for cardiac surgical procedures. In: *Miller's Anesthesia*, 8th Edition. Edited by Ronald D. Miller, M.D., Neal H. Cohen, M.D., Lars I. Eriksson, M.D., Ph.D., Lee A. Fleisher, M.D., Jeanine P. Wiener Kronish, M.D., William L. Young, M.D. Philadelphia, Elsevier, 2015 pp 2007–2095
- Perel A (2017) The value of dynamic preload variables during spontaneous ventilation. *Curr Opin Crit Care* 23(4):310–317. <https://doi.org/10.1097/MCC.0000000000000430>
- Stanley TH, Weidauer HE (1973) Anesthesia for the patient with cardiac tamponade. *Anesth Analg* 52(1):110–114

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Submit your manuscript to a SpringerOpen[®] journal and benefit from:

- Convenient online submission
- Rigorous peer review
- Open access: articles freely available online
- High visibility within the field
- Retaining the copyright to your article

Submit your next manuscript at ► [springeropen.com](https://www.springeropen.com)