

# Journal Pre-proof

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**BJAN-D-20-00235 - Case Report****Anesthetic induction and endotracheal intubation in the sitting position due to the fixed forearm caught by a meat grinder**

Hiroyuki Kinoshita<sup>a,b,\*</sup>, Noriko Sato<sup>b</sup>, Shinichiro Mimura<sup>b</sup>, Shigeru Kato<sup>b</sup>, Tomosue Takada<sup>b</sup>, Yoshiki Nakajima<sup>c</sup>

<sup>a</sup>Tokushima University Graduate School, Institute of Biomedical Sciences, Department of Anesthesiology, Tokushima, Japan

<sup>b</sup>Seirei Mikatahara General Hospital, Department of Anesthesiology, Hamamatsu, Japan

<sup>c</sup>Hamamatsu University School of Medicine, Department of Anesthesiology and Intensive Care, Hamamatsu, Japan

**\*Corresponding author.**

E-mail: [hkinoshi@krc.biglobe.ne.jp](mailto:hkinoshi@krc.biglobe.ne.jp) (H. Kinoshita).

ORCID ID: 0000-0002-2221-7871

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**Abstract**

A male patient was scheduled for urgent amputation of his right forearm. His right forearm was stuck inside the insertion slot of a meat grinder, resulting in severe pain to his injured arm. His upper body could not move to sit in a semi-upright position. An endotracheal tube was successfully placed after rapid sequence intubation using a video laryngoscope from behind the patient on the first attempt. This case report is the first documentation of successful anesthetic induction with subsequent endotracheal

intubation using a video laryngoscope from behind an injured patient whose upper body was upright with limited positioning.

KEYWORDS: Anesthesia; Sitting position; Tracheal intubation; Video laryngoscope

## **Introduction**

Tracheal intubation in the sitting position is challenging for emergency medicine, intensive care, and anesthesiology personnel.[1,2] Recent reports have recommended using video laryngoscopy combined with face-to-face intubation in Fowler's position, which is semi-upright, with the patient's back reclined at approximately 60 degrees.[1,2] However, some difficulties appear to exist in implementing the intubation procedure in the semi-upright position in a face-to-face manner, as a previous report documented the failure of this technique.[1,2] This case report is the first documentation of successful anesthetic induction with subsequent endotracheal intubation using a video laryngoscope from behind an injured patient, whose upper body was upright with a limited body posture due to the fixed forearm caught by a manufacturing machine.

## **Case report**

We obtained informed consent for this case report from the patient. A 39-year-old male patient (height 170 cm, weight 75 kg) was transported via ambulance to our emergency department and was scheduled for urgent amputation of his right forearm below the elbow. His right forearm became accidentally stuck in the insertion slot of a meat grinder, and his right fingers and the distal part of his forearm appeared to be severely mangled (Fig. 1A). The emergency crew brought part of the meat grinder with the victim, after taking

apart most of the machine on-site, as the machine was too heavy to transfer to the operating room with the patient (Fig. 1A). The patient received a total of 150 µg IV (intravenous) fentanyl via a 20G catheter indwelling in his left cephalic vein during the 145 minute transportation to the emergency department. His blood pressure was 170/124 mmHg (heart rate 97 bpm) on arrival, due to severe pain and his past medical history of hypertension. The anesthesiologist in charge noticed that the meat grinder's insertion slot was completely stuck the patient's right arm just below the elbow, resulting in severe pain to his injured arm. He was unable to recline his upper body to sit in the semi-upright position, which would have been beneficial for anesthetic induction and tracheal intubation (Fig. 1B). The emergency care team decided to perform a rapid sequence induction with support to his upper body from both sides and his neck from the back (Fig. 1B), as his injury occurred three hours after breakfast, indicating a possible full stomach condition.

The monitoring of noninvasive blood pressure measured at his left upper arm, electrocardiogram, and percutaneous arterial blood oxygen saturation was initiated. General anesthesia was induced with 140 mg IV propofol and remifentanyl IV  $0.4 \mu\text{g}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ , supplemented by rocuronium 50 mg IV after preoxygenation with  $6 \text{ L}\cdot\text{min}^{-1}$  oxygen for three minutes in the upright sitting position. One minute after induction without bag-mask ventilation, an 8.0-mm cuffed tracheal tube was successfully inserted into the trachea using an AirwayScope™ video laryngoscope (AWS-S100; Nihon Kohden, Shinjuku, Tokyo, Japan) from behind on the first attempt (Fig. 1C). His mean blood pressure (118 to 123 mmHg) and percutaneous arterial blood oxygen saturation (95 to 99%) were stable, and he demonstrated tachycardia (heart rate 105 to 120 bpm) during

the time from anesthetic induction to the completion of tracheal intubation.

Orthopedic surgeons performed amputation of his right forearm below the elbow with the same maintained upper body and neck support as for anesthetic induction. The surgical procedure was performed using a tourniquet on the patient's right upper arm and lasted for 22 minutes with 60-ml blood loss. The patient's perioperative course was uneventful and without any significant complications.

## **Discussion**

We have successfully implemented anesthetic induction with subsequent endotracheal intubation using a video laryngoscope from behind an injured patient whose upper body was completely upright and with a limited body posture. We did not adopt the previously-reported face-to-face intubation technique in our case.[1,2] The reasons are as follows: first, we were not familiar with face-to-face intubation using video laryngoscopy in the sitting position, whereas we were aware of a previous report documenting the failure of this technique;[1] second, the anesthesiologist in charge could maintain the patient's patent airway from behind since he was standing on a step (Fig. 1); third, we supposed that the patient might need additional airway procedures, including bag-mask ventilation or supraglottic airway device insertion, which we could perform from behind the patient if difficult intubation was encountered;[3] fourth, our patient had severe pain and we assumed he was non-fasting, thus we thought that a rapid sequence induction in the upper body upright position would be the most appropriate. These reasons were also why we did not employ emergency endoscopic tracheal intubation in a sitting position in our case.[4] Indeed, it is critical to note that AirwayScope™ video laryngoscopy can

complete faster tracheal intubation without adding high pressure to the tongue compared with standard Macintosh laryngoscopy in the sitting position.[5]

### **Conclusions**

This case report documents that an anesthetic induction with subsequent endotracheal intubation using a video laryngoscope from behind a patient whose upper body was upright is feasible. However, several possible risks of anesthetic induction and airway management from behind a patient in the upper body upright position might exist, and therefore, further studies will be required to verify the benefit.

### **Conflicts of interest**

The authors declare no conflicts of interest

### **Acknowledgements**

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### **References**

- [1] Hsieh P-S, Ma H-P, Wong C-S, et al. Emergency tracheal intubation in an ankylosing spondylitis patient in a sitting position using an airway scope combined with face-to-face and digital intubation. *J Emerg Med.* 2018;54:674-7.
- [2] Suzuki A, Terao M, Aizawa K, et al. Pentax-AWS airway Scope as an alternative for awake flexible fiberoptic intubation of a morbidly obese patient in the semi-sitting position. *J Anesth.* 2009;23:162-3.
- [3] Yamasaki T, Otake K, Kinoshita H. The use of i-gel<sup>®</sup> at the prone position in a patient with massive pulmonary bullae. *Minerva Anesthesiol.* 2019;85:204-5.

[4] Tsunoda A, Kobayashi Y, Tou M, et al. Emergency videoendoscopic endonasal tracheal intubation for severe upper airway stenosis. *Am J Otolaryngol-Head and Neck Med Surg.* 2021;42:102779.

[5] Gaszyński TM. A comparison of a standard Macintosh blade laryngoscope, Pentax-AWS videolaryngoscope and intubrite videolaryngoscope for tracheal intubation in manikins in sitting and prone positions: a randomized cross-over study. *Diagnostics* 2020;10:603.

**Figure 1** – A, The patient’s right forearm accidentally stuck at the insertion slot of the meat grinder. Note that his right fingers appeared to be hacked to pieces; B, Preoxygenation in the upright position; C, Anesthetic induction with subsequent endotracheal intubation from the behind of an injured patient, whose upper body was upright.

