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Use of stylet and airway management procedure in critically ill patients. Author's reply

Samir Jaber^{1,2*} and Audrey De Jong¹

We thank Masuda et al. for their letter [1] concerning our article, entitled "Effect of the use of an endotracheal tube and stylet versus an endotracheal tube alone on first-attempt intubation success: a multicentre, randomized clinical trial in 999 patients" [2]. We value that the authors of the letter appreciated the clinical value of the study and its impact on intubation providers in daily clinical practice.

As accurately stated by Masuda et al., it is important to emphasize that the operators of the STYLETO pragmatic study were prompted to follow the "Montpellier-Intubation-Protocol" [3] (Table 1). This probably accounts for the lower rate of severe complications reported in the "STYLETO" study [2] in comparison with the international "INTUBE" study [4]. Briefly, the "Montpellier-Intubation-Protocol" [3] aims to prevent severe hypoxemia and severe collapse, in three time-periods: (1) before intubation (fluid-loading, early introduction of vasopressors, preoxygenation with noninvasive ventilation (NIV) without or with high-flow nasal cannula oxygen (HFNO) called OPTINIV method for apnoeic oxygenation, preparation of sedation and presence of two operators), (2) during intubation (rapid-sequence induction using short-acting hypnotics and a rapid-onset muscle relaxant) and (3) after intubation (capnography to check correct tube position in the trachea, long-term sedation, protective ventilation with low airway pressure at first and a recruitment manoeuvre following intubation after hemodynamic stabilization).

We totally agree with the authors of the letter that the drugs used in the STYLETO study [2], mostly ketamine and etomidate may have an impact on the lower complication rate observed in the STYLETO study in comparison with the INTUBE study [4], where propofol was widely used. Moreover, the OPTINIV method associating use of NIV for preoxygenation (the reference method in severe hypoxemic patients) and HFNO for both preoxygenation and apnoeic oxygenation, suggested a superiority of NIV associated to HFNO, compared to NIV plus sham HFNO. Both methods of preoxygenation (NIV alone and OPTINIV) were little-used in the INTUBE study [4], whereas used in over half of the cases in the STYLETO study [2]. Another very important point is the use of capnography, used in only 34.5% of all patients in the INTUBE study. In comparison, capnography was used in more than 84% of patients in the STYLETO study. The use of capnography is of prime importance for a quick check of the tracheal position of the tracheal tube, to enable earlier recognition of an oesophageal intubation and reduce associated complications.

It is worth noting that a simplified version of the Montpellier-intubation-protocol [5] was externally validated by an American team and associated with an improvement in first-pass intubation success rates and a reduction in the rate of intubation-related complications. As nicely written by Masuda et al. [1], using the Montpellier-intubation-protocol [3] first described by Jaber et al. in 2010 (Table 1) may help to decrease intubation-related complications.

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Table 1 Update of the Montpellier-Intubation Protocol adapted from Jaber et al. ICM 2010 [3]

Pre-intubation

- 1. Two operators (i.e., 4 hands)
- 2. Fluid loading if no cardiogenic pulmonary oedema
- 3. Systematic early introduction of vasopressors
- 4. Preparation of long-term sedation
- 5. For preoxygenation, upright position (20–30° bed) when possible
- 6. Preoxygenation during at least 3 min with noninvasive ventilation in case of hypoxemic acute respiratory failure (FiO₂ 100%, pressure support between 5 and 10 cmH₂O to obtain an expired tidal volume between 6 and 8 mL/kg and a PEEP of 5 cmH₂O), associated with apnoeic oxygenation when available and high-risk of hypoxaemia (OPTINIV method)

Per-intubation

- 7. Use first video laryngoscope for intubation procedure, if no video laryngoscope available, consider direct Macintosh laryngoscopy with Stylet
- 8. Rapid sequence induction:
 - Etomidate 0.2–0.3 mg/kg or ketamine 1.5–3 mg/kg or propofol 1.5–3 mg/Kg intravenous
 - Succinylcholine 1 mg/kg intravenous (without contra-indications)
 - Rocuronium: 1.2 mg/kg intravenous in case of contra-indications to succinylcholine
- 9. Sellick manoeuvre
- 10. Ventilation in case of oxygenation desaturation < 90% or if elevated risk of oxygen desaturation higher than the risk of aspiration

Post-intubation

- 11. Capnography to check correct placement in trachea of the tube
- 12. Increase vasopressors especially if diastolic arterial pressure < 35 mmHg or systolic arterial pressure < 90 mmHg
- 13. Start early long-term sedation
- 14. Low airway pressure ventilation at the beginning: tidal volume 6–8 mL/kg, PEEP < 5 cmH₂O and respiratory rate between 10 and 20 /min, FiO₂ 100%, for a plateau pressure < 30 cmH₂O (protective ventilation will be started after hemodynamic stabilization)
- 15. Recruitment manoeuvre: PEEP of 30–40 cmH₂O during 20–30 s, FiO₂ 100% (if no cardiovascular collapse and in non-hypovolemic patient)
- 16. Cuff pressure of the tube between 25 and 30 cmH₂O without leaks

The recommendations are not mandatory, but they have to be “considered”, according to some randomized controlled trials, some observational studies and expert opinions [3]

FiO₂ Inspired Oxygen Fraction, PEEP positive end-expiratory pressure, OPTINIV noninvasive ventilation with high-flow nasal cannula oxygen

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Declarations

Conflicts of interest

SJ reports receiving consulting fees from Drager, Medtronic, Baxter, Fresenius-Xenios, and Fisher & Paykel. ADJ reports receiving consulting fees from Medtronic.

Ethics committee approval

Not applicable.

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