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Intubation in Operating Room *versus* Intensive Care: Comment

To the Editor:

With great interest, we read the article by Taboada *et al.*[1] comparing tracheal intubation conditions in operating rooms and intensive care units. Not surprisingly, intubations in the intensive care unit were associated with worse intubation conditions and greater complications. The most frequent indication for intubation in the intensive care unit was acute respiratory failure (83%), and 63% of patients needed noninvasive ventilation before intubation.[1] Intubation was by direct laryngoscopy, during apnea. The complication of hypoxia (oxygen saturation less than 80%) occurred in 19 intensive care unit patients (9%, although it was reported incorrectly in table 2 of the article as 14%). Minimizing apnea time is important for critically ill patients in respiratory failure, who might not tolerate prolonged desaturation. There are three common ways to maintain the oxygenation during intubation, including apneic oxygenation by various techniques,[2] continued ventilation during intubation through a supraglottic airway guided by a flexible scope,[3–5] and continued mask ventilation (fig. 1) during intubation by a flexible scope.[6] We consider this method to have several advantages, including (1) apnea is almost nonexistent, and continuous ventilation increases oxygenation safety margins; (2) removing a face mask is easier than removing a supraglottic airway; (3) the technique is amenable to the nasal intubation; and (4) the method can be used with a reinforced endotracheal tube. We believe that with improved oxygenation during intubation in critically ill patients, the incidence of hypoxemia can be reduced.

Competing Interests

The authors declare no competing interests.

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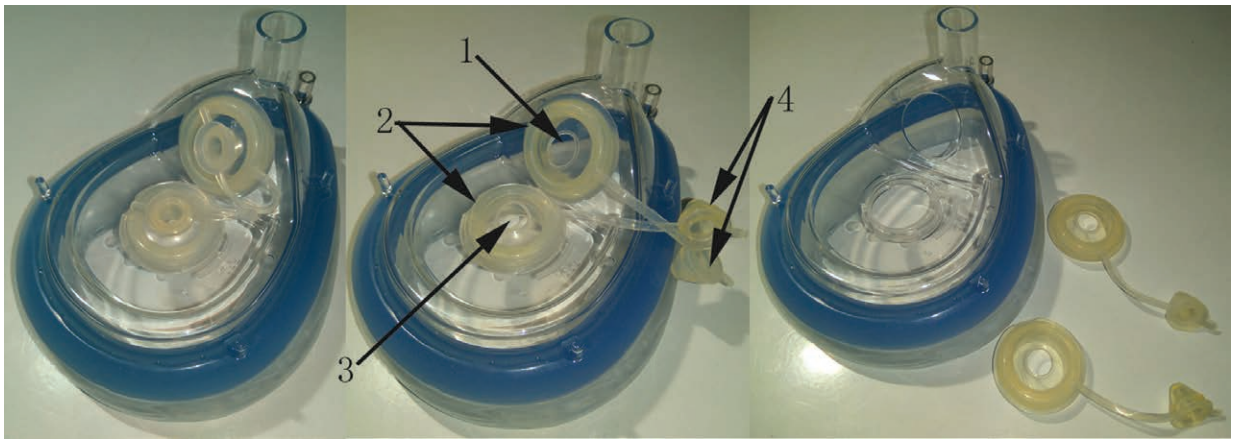

Fig. 1. Second generation endoscope and anesthesia mask (size 6). The *left* mask was sealed; the sealing cap was open in the *center* mask; and the sealing ring was taken off in the *right* mask. *Arrow 1* indicates the nasal operating hole; *double arrow 2* indicates the sealing rings; *arrow 3* indicates the oral operating hole; and *arrow 4* indicates the sealing cap.

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Intubation in Operating Room *versus* Intensive Care: Reply

In Reply:

We thank Dr. Wang, Dr. Xu, and Dr. Deng for their useful comments about our article entitled "Comparison of Tracheal Intubation Conditions in Operating Room and Intensive Care Unit: A Prospective, Observational Study."[1] It is true: we had a mistake in table 2. The complication of hypoxia less than 80% was 29 patients (14%) in the intensive care unit (ICU), but table 2 mistakenly shows 19 patients (14%).

In our study, nearly 90% of patients in the ICU were intubated at first attempt, and the neuromuscular blocking drug used was succinylcholine. We did not record the duration of the apnea, but it probably was less than 1 min in patients intubated at first attempt. We agree with Dr. Wang *et al.* that it is important to minimize this apnea time during intubation for critically ill patients. In the "Guidelines for the management of tracheal intubation in critically ill adults," published in November 2017, Higgs *et al.*[2] recommend nasal oxygen at 15 l/min or high-flow nasal oxygenation during intubation attempts. In October 2017, Oliveira *et al.*[3] published an interesting review and meta-analysis to evaluate the effectiveness of apneic oxygenation during emergency intubation. They observed that apneic oxygenation was associated with increased periintubation oxygen saturation and decreased rates of hypoxemia. We finished our study in November 2017 when the guidelines for the management of tracheal intubation in critically adults were published.[2] From that moment on, we used apneic oxygenation to try to achieve decreased rates of hypoxemia. As of now, in our intensive care unit we are routinely using apneic oxygenation during tracheal intubation.

Wang *et al.* propose an interesting method to decrease rates of periintubation hypoxemia. The method consists of an anesthesia mask that can ventilate during tracheal intubation with a fiberoptic bronchoscope.[4] They described this technique in their letter to the editor; however, the authors did not report whether this technique was used in surgery anesthetized patients, hypoxic patients, critically ill patients, obesity patients, or awake patients. Similar endoscopic masks like the Patil mask have been described in the literature to overcome the problem of ventilation during fiberoptic intubation. For example, Aoyama *et al.*[5] compared the efficacy of delivery of mechanical ventilation through different airway devices during fiberoptic intubation. One of these devices was an endoscopy mask like the one presented by Wang *et al.* However, Aoyama *et al.*, unlike Wang *et al.*, described equipment and preparation, anesthetic management, placement of the airway devices, and fiberoptic intubation procedure. One important limitation of their study is that patients with a difficult airway, lung disease, or morbid obesity were not included. Thus, their results may not apply to those groups of patients or to critically ill patients.

We think that the use of a fiberoptic intubation with a mask ventilation for critically ill patients has several limitations. The first limitation is that this mask is useful only when a patient can be easily ventilated. The second limitation observed with these types of masks is gastric insufflation,[5–7] especially when a long time is required for intubation. Many ICU patients have a full stomach with a risk of aspiration, and gastric insufflation may be dangerous. The third limitation is that a fiberoptic intubation can be difficult in a lot of ICU patients because of the presence of hemorrhage, laryngeal edema, and increased secretion in the airway.

In conclusion, we agree with Wang *et al.* that hypoxia is an important problem during intubation in the ICU. Probably the use of mask ventilation during fiberoptic intubation with their limitations may be useful in selected cases in the ICU, but we do not recommend routine use. We think this method should be further evaluated in the ICU setting and in patients with a difficult airway, lung disease, or morbid obesity.

Competing Interests

The authors declare no competing interests.