A safe strategy for anesthesia induction and airway management in morbidly obese patients

Hai-Xia Wang, Lei Wan, Ming Tian, Fu-Shan Xue

Department of Anesthesiology, Beijing Friendship Hospital, Capital Medical University, Beijing 100050, China.

To the Editor: Morbidly obese patients are known to be difficult for facemask ventilation and tracheal intubation, leading to an increased risk for a “cannot intubate cannot ventilate” situation. Awake tracheal intubation is often considered as one of the safest strategies for anesthesia induction and airway management in patients with known or predicted difficult airways, but the technique itself is an uncomfortable procedure. When the tracheal intubation is performed under general anesthesia in patients with known or predicted difficult airways; however, the thing that anesthesiologists mostly concern is difficult facemask ventilation. Thus, the development of a strategy for always maintaining adequate ventilation and oxygenation throughout each step of airway security in anesthetized patients with known or predicted difficult airways is important.[1] In this observational study, we assessed the feasibility and safety of a new strategy for anesthesia induction and airway management, in which sevoflurane inhaled anesthesia with spontaneous breathing was first used for insertion of supraglottic airway device (SAD) and then routine intra-venous anesthesia and neuromuscular blockade were applied for tracheal intubation via the SAD in morbidly obese patients.

The study was approved by the Ethical Committee of Beijing Friendship Hospital (No. 2016-P2-059-01) and registered at the Chinese Clinical Trial Register (http://www.chictr.org.cn; ChiCTR-IPR-16009071). After obtaining the written informed consent, 20 morbidly obese patients undergoing bariatric surgery with the American Society of Anesthesiologists class I-II were recruited. During pre-operative visiting, airway assessments including Mallampati class, neck circumference, thyromental distance, inter-incisor distance, and history of snoring were recorded. Both blood pressures and heart rate were measured to the targeted end-tidal concentrations was maintained at least 0.9 to 1.0 for 5 min. During anesthesia induction, spontaneous breathing was maintained through a facemask with oxygen plus sevoflurane without the use of artificial airway. The jaw thrust was used to maintain the upper airway patency and predict the insertion conditions of SAD. If respiratory depression occurred and apnea time was over 60 s during anesthesia induction, assisted ventilation was performed. When motor and upper airway reflex responses to jaw thrust disappeared, a Blockbuster™ SAD [Supplemental Figure 1A, http://links.lww.com/CM9/A58] (Tuo Ren Medical Instrument Co., Ltd., Changyuan City, China), was inserted. After adequate ventilation via the SAD was confirmed by bilateral chest movements and capnography [Supplementary Figure 1B, http://links.lww.com/CM9/A58], a fiberoptic bronchoscope (FOB) was used to assess the placement of SAD. Once a secured airway was achieved, propofol 2 mg/kg, sufentanil 0.3 to 0.4 μg/kg and rocuronium 0.6 mg/kg were intra-venously administered according to ideal body weight. When adequate anesthetic depth (bispectral index <60) and neuromuscular blockade were achieved, the FOB-guided intubation was performed via the SAD [Supplemental Figure 1C, http://links.lww.com/CM9/A58]. Following tracheal intubation, the SAD was removed and tracheal tube was fixed. The lowest SpO2 during anesthesia induction and times required for SAD insertion and tracheal intubation were recorded. Both blood pressures and heart rate were also observed before induction, immediately before SAD insertion and at 1 min after SAD insertion, respectively.
Of 20 recruited patients, 15 were females, 16 had a history of obstructive sleep apnea syndrome, seven were hyperten-
sion, and eight were diabetes mellitus. The patients’ body mass index was 47.5 ± 7.2 (range, 35–61) kg/m², age was 30.5 ± 5.5 (23–46) years, neck circumference was 47.0 ± 3.8 (40–55) cm, thyromental distance was 10.5 ± 0.89 (9–12) cm, and inter-incisor distance was 5.2 ± 0.5 (4.5–6.0) cm. The percentages of patients with Mallampati classifications 1, 2, 3, and 4 were 5%, 35%, 55%, and 5%, respectively. During sevoflurane inhalational intubation, one patient developed apnea with a duration of about 60 s, which was relieved by manual ventilation and increasing anesthetic depth. The mean end-tidal concentration of sevoflurane required for adequate insertion of the SAD ranged from 2.7% to 3.0%. Both SAD insertion and FOB-guided intubation were successfully completed without any difficulty in all patients. Throughout anesthesia induction and airway management, SpO₂ was maintained at 92% or more in all patients. The airway management data, related hemodynamic changes, and adverse events of all patients were summarized in Table 1.

According to our experience, this new strategy for anesthesia induction and airway management in morbidly obese patients has some logical features. First, anesthesia induction is performed using sevoflurane with spontaneous breathing and airway patency is assessed. If airway obstruction occurs with increased anesthetic depth and cannot be relieved by routine airway maneuvers, sevo-
flurane is turned off and the patient can rapidly woken up.[10] Second, given the facts that fully pre-oxygenated obese patients desaturate twice as fast as patients with a normal weight during apnea[21] and have an increased risk of pulmonary complications including aspiration, a second generation SAD with the gastric drainage channel is first inserted to secure the airway after sevoflurane anesthesia induction. The available literature shows that for morbidly obese patients, the use of SAD prior to tracheal intubation is beneficial in improving quality of ventilation, increasing safe apnea period, and achieving a faster recovery from hypoxemia.[3] Furthermore, an additional gastric drainage channel of second-generation SAD may decrease the risk of aspiration during anesthesia induction.[4] Third, when correct placement of SAD is confirmed by clinical signs and FOB examination, anesthesia depth is increased by intravenous agents and neuromuscular blocking agent is given to provide adequate conditions for FOB-guided intubation via the SAD. The main advantage of FOB-guided intubation using the SAD as a conduit is the ability to allow unhurried fiberoptic instrumentation while maintaining continuous ventilation through a dedicated airway.[11] Even if the FOB-guided intubation fails, the placed SAD can maintain effective ventilation, avoiding the occurrence of a “cannot intubate cannot ventilate” situation.

In conclusion, when using this new strategy for anesthesia induction and airway management in morbidly obese patients, adequate ventilation and oxygenation can always be maintained throughout each step of airway security, namely; ventilation is ensured first using the facemask with spontaneous breathing under sevoflurane inhalational induction, and subsequently through SAD and tracheal intubation after adequate anesthesia. Due to not using neuromuscular blocking agent before airway control and no need of awake airway instrumentation, it is safe and comfortable. Thus, we consider that this new strategy may be a feasible and safe method for anesthesia induction and airway management in morbidly obese patients.

**Conflicts of interest**

None.

**References**

1. Xue FS, Liu QJ. Tracheal intubation awake or under anesthesia for potential difficult airway: look before you leap. Chin Med J 2018;131:753–756. doi: 10.4103/0366-6999.226891.
2. Wong DT, Yang JJ, Mak HY, Jaganathan N. Use of intubation introducers through a supraglottic airway to facilitate tracheal intubation: a brief review. Can J Anesth 2012;59:704–715. doi: 10.1007/s12630-012-9714-8.
3. Sinha A, Jayaraman L, Punhani D, Panigrahi B. ProSeal laryngeal mask airway improves oxygenation when used as a conduit prior to laryngoscope guided intubation in bariatric patients. Indian J Anaesth 2013;57:25–30. doi: 10.4103/0019-5049.108557.
4. Freerk C, Mitchell VS, McNarry AF, Mendonca C, Bhagrath R, Patel A, et al. Difficult Airway Society intubation guidelines working group. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. Br J Anaesth 2015;115:827–848. doi: 10.1093/bja/aev371.

How to cite this article: Wang HX, Wan L, Tian M, Xue FS. A safe strategy for anesthesia induction and airway management in morbidly obese patients. Chin Med J 2019;132:1747–1748. doi: 10.1097/CM9.0000000000003240

| Table 1: Airway management data, related hemodynamic changes and adverse events of morbidly obese patients (n = 20). |
|---------------------------------------------------------------|
| **Items**                                      | **Results**                      |
| Time required for SAD insertion (s)  | 315 ± 17                        |
| Time required for tracheal intubation (s) | 423 ± 23                        |
| Systolic blood pressure (mmHg)            |                                |
| Before induction                           | 147 ± 12                        |
| Immediately before SAD insertion          | 129 ± 10*                        |
| 1 min after SAD insertion                 | 127 ± 8.9*                       |
| Diastolic blood pressure (mmHg)           |                                |
| Before induction                           | 80 ± 10                         |
| Immediately before SAD insertion          | 69 ± 7*                         |
| 1 min after SAD insertion                 | 68 ± 7*                         |
| Heart rate (beats/min)                    |                                |
| Before induction                           | 79 ± 11                         |
| Immediately before SAD insertion          | 71 ± 8*                         |
| 1 min after SAD insertion                 | 77 ± 8                          |
| Number of patients with apnea             | 1 (5.0)                         |
| Lowest SpO₂ during induction (%)          | 97 (95–98 [92–100])             |

Values are expressed as mean ± SD, n (%), or median (IQR [range]). ∗P < 0.01, compared to values before induction. SAD: Supraglottic airway device; SpO₂: Pulse oxygen saturation.