Case Report

Awake tracheal extubation, can be anticipated? case reports

ABSTRACT

Perioperative airway management is a crucial task for anesthesiologists. Several perioperatively techniques make it difficult to predict the appropriate time for tracheal extubation. The aim of this article is to report the successful anticipation of an appropriate time for awake tracheal extubation. Three cases were observed related to smooth recovery without airway complication following intentionally removing airway devices after specific time. These reports demonstrate the relationship between awake status and return of spontaneous breathing which may demonstrate a good recovery of different sites of central nervous system from anesthesia effects. Theoretically, the appropriate time for awake tracheal extubation can be anticipated.

Key words: Awake, anticipation, extubation

Introduction

Perioperative airway management is a crucial task for anesthesiologists. Compared to tracheal intubation, there exists limited guide in the literature about the process of extubation which makes the process a lot more stressful and demanding.[1] The Difficult Airway Society has published guidelines for the management of tracheal extubation to improve patient safety and facilitate smooth emerge.[2] However, incidence of airway complications related to tracheal extubation still persists and remains unpredicted.[3] The quality of healthcare being delivered in regard to tracheal extubation largely varies, and it seems like a flip coin.

Laryngospasm causes are determined subjectively based on the expert opinions.[3] Referring to the cause of laryngospasm to the light plane of anesthesia still exists but is not understandable.[3] Deep and awake tracheal extubation was the known techniques that have their advantages and disadvantages.[4] Creating a method that has the benefit of both techniques might be possible.

To the date, anticipate appropriate time for awake tracheal extubation has not been reported yet.

Case Description

Case 1

A 28 years old, 62 kg and medically free patient who received general anesthesia for the removal of screw from left ulnar bone. Patient was induced to anesthesia with 150 mg of propofol, 200 mcg of fentanyl and intubated with laryngeal mask airway (LMA) size 4. Patient was mechanically ventilated with synchronized intermittent mandatory ventilation (SIMV) mode and anesthesia was maintained with Sevoflurane MAC 1 (conc. 2%) with FiO_2 of 0.5 and auto-flow with minimum

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2 L/min. After cleaning the patient, no one was allowed to touch or stimulate the patient. Sevoflurane was turned off. Flow was increased to 10 L/min, FiO_2 was increased to 1 and ventilator machine's clock was reset to 0. After 4 minutes, ventilator mode was changed to manual and $EtCO_2$ was built and maintained between 45 and 50 mmHg. Patient started to breathe after 7:50–7:55 minutes and LMA was removed at 15:20–15:25 minutes. (7:30 minutes from spontaneous breathing time). Patient heart rate was 52 beats per minute, blood pressure was 89/56, SpO2 was 100%, respiratory rate was 10 breathes per minute, tidal volume was 353 mL, $EtCO_2$ was 47 mmHg, and Sevoflurane MAC was 0.2 (conc. 0.3%). After removing of LMA, patient showed coordinating movement, smiling, answering questions raised by the team well and no oxygen supplement was required.

Case 2

An 18 years old with 70 kg, and medically free patient who received general anesthesia and interscalene brachial plexus nerve block for open reduction and internal fixation of open fracture of forearm bones. Patient was intubated with endotracheal tube (ETT) size 7. Patient received 200 mcg of fentanyl and 1 mg of midazolam. Duration of operation excluding extubation process was 135 minutes. Patient was under mechanical ventilation with volume control mode and Sevoflurane MAC 1 all the time. Sevoflurane was turned off, flow was increased to 10 L/min, and mode was changed to SIMV mode when patient was free of stimulation. Mechanical ventilation was turned to manual breathing after 3 minutes and $EtCO_2$ was built and maintained between 45 and 50 mmHg. Patient started to breathe after 5:30 minutes and tracheal was extubated after 7:30 minutes from the started breathing (total time is 13 minutes). Patient was mildly sedated, turned head to the sides, moved the other arm toward the chest with parameters before extubation: HR of 83 bpm, RR of 19 breathe/min, BP of 121/48, TV of 250 mL, and MAC of 0.3 (conc. 0.7%). When patient's name was called, patient was responded, and eyes were opened.

Case 3

A 22 years old with 78 kg, and medically free patient who received general anesthesia for genioplasty procedure. Patient was nasally intubated with size of 7. Patient received 300 mcg of fentanyl, 3 mg of morphine, and 1 gram of paracetamol. Duration of operation excluding extubation process was around 120 minutes. Patient was under mechanical ventilation with volume control mode and Sevoflurane MAC 1 all the time. When the surgeon and nurse finished cleaning and dressing the patient, Sevoflurane was turned off, flow was increased to 10 L/min, clock was reset and started from zero time and patient was still being ventilated by the machine with SIMV mode for 4 minutes before changed to manual ventilation to build up $EtCO_2$ to 45-50 for respiratory center stimulation. Patient started to breathe after 11:30 minutes from turning off of Sevoflurane. Tracheal extubation was done after around 7:36 minutes from the spontaneous breathing time (19:06 minutes total time) with HR of 67 bpm, RR of 15 breathe/min, BP of 120/70, TV of 350 mL, and MAC of 0.2-0.3 (conc. 0.5%). Patient looked around, turned to the right side, and returned to sleep.

Discussion

Through these cases, we observed the possible relationship between fully awake status and beginning of spontaneous breathing, supporting the presence of different sites for Sevoflurane anesthetic action required to be anesthetized or recovered to prevent undesirable airway reflexes and may explain the mechanism of treating laryngospasm by increasing the respiratory drive.[5,6] In these cases, patients recovered smoothly from balanced anesthesia with MAC 1 Sevoflurane, and airway devices were removed safely after 7:30 minutes from the starting of spontaneous breathing. Additionally, the steadiness of patients' heart rate was believed to be the key for successfully smooth tracheal extubation.

Several studies had reported awareness time, emergence time, neurological examination time, and orientation time differently. However, few of them reported time of returning to spontaneous breathing that supported this finding.[7,8] However, the cause of unwanted airway reflexes could be due to unsynchronized recovery of brain and brainstem, a stage that can define the light plane of anesthesia physiologically. These observations may support the use of no-touch technique to ensure the recovery of different sites on central nervous system.[9]

Lack of definition regarding awake tracheal extubation may lead to premature tracheal extubation due to confusion between fully awake status and hyper-excitatory status. However, with advantages of using balanced anesthesia to mask excitability stage; anesthesiologists may do premature tracheal extubation by over stimulating their patients.[10]

Conclusion

To date, these cases may be the first anticipation of awake tracheal extubation reports. Due to the seriousness of tracheal extubation techniques, a multi-institutional, prospective case series would be required to establish the effectiveness of these observations. Proving this method as a safe way, it may reduce the pressure on both anesthesiologists and patients. The researcher theorized that fully awake

status and appropriate time for tracheal extubation can be anticipated.

Declaration of patient consent

The authors declare that they have obtained consent from patients. Patients have given their consent for their images and other clinical information to be reported in the journal. Patients understand that their names will not be published and due efforts will be made to conceal their identity but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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