INTRODUCTION

Oesophageal foreign body removal surgery often causes blood pressure rapid increase, heart rate fluctuation, and easily inducible heart and cerebrovascular incidents in elderly patients. Concurrently, the head is occupied by the surgeon, making it difficult for respiratory management during the operation. The Wei nasal jet tube (WEI NASAL JET or WNJ, Well Lead Medical Equipment Ltd., Guangzhou, China. Production batch number: 20140901. Figure 1) is a new type of nasal airway. It can be connected to an anaesthesia machine directly for oxygen delivery, and it has two channels built inside the tube wall for jet ventilation and the end-tidal pressure of CO₂ monitoring, respectively.¹ Supraglottic jet oxygenation and ventilation (SJOV) using WNJ has been proved to have the ability of enhancing oxygenation during upper gastrointestinal endoscopy in patients sedated with propofol,² and has been demonstrated to save patients from a Can’t Intubate, Can’t Ventilate (CICV) emergent difficult airway, even with failed laryngeal mask airway(LMA).³ SJOV by WNJ has also been shown to provide sufficient oxygenation/ventilation in a morbidly obese patient with severe respiratory depression.⁴ However, there is no report concerning its use in patients with a high risk for anaesthesia. In this case report, we describe a case where a WNJ was used to maintain sufficient oxygenation and ventilation for oesophageal foreign body removal surgery in a patient with fragile cardiopulmonary function.

CASE HISTORY

A 70-year-old female, ASA III, Mallampati III, weight of 75 kg and a BMI of 30.82 kg/m² was scheduled for oesophageal foreign body removal surgery under general anaesthesia. She had major surgery for oesophageal carcinoma by thoracoscope 3 years ago, with postoperative radiotherapy. After oral administration of an nifedipine capsule 3 days before surgery, the patient was scheduled for oesophageal foreign body removal surgery. The patient had a history of hypertension and diabetes mellitus. The patient was admitted to the postoperative intensive care unit on the day of surgery and was scheduled for oesophageal foreign body removal surgery under general anaesthesia. The surgery was performed under general anaesthesia using a WNJ. The surgery was uneventful, and the patient was discharged from the postoperative intensive care unit on the day of surgery.
ago, the patient appeared to cough when drinking only small volumes (4-5 ml) of water [Figure 2]. The patient was anxious, irritable, gasping for breath with increased secretion. She also was diagnosed as having coronary heart disease, hypertension and diabetes mellitus. A chest X-ray showed a tracheal shift without narrowing. The chest CT scan displayed left pulmonary apical bullae, pulmonary atelectasis of the left upper lobe of the anterior segment, and right middle lobe. The blood gas analysis showed: pH 7.46, PO2 75.3 mmHg, PCO2 23 mmHg, BE 3.5 mmol/L. The echocardiogram showed left atrial dilatation, left ventricular ejection fraction 46% and ECG showed a first degree heart block.

The patient entered operating room in a semi-sitting position.

Baseline vital signs showed Bp 152/61 mmHg, HR 78 beats/min, SpO2 of 93% (95% with mask, 100% oxygen 5 L/min for 5 min), RR 22/min. Imidazole 1.5 mg and sufentanil 5 µg was given intravenously for sedation. The patient was then in a lethargic state. Next, she was administered with 1% tetracaine 2 ml oropharyngeal surface anaesthesia for 5 minutes, followed by1% tetracaine (1 ml), and 0.6% ephedrine (0.5 ml) in the right nostril for anaesthesia. After 10 minutes, the WNJ was placed in the patient’s right nostril without any obvious discomfort, and blood pressure and heart rate showed no significant fluctuation. Then, the threaded pipe was connected to WNJ, and oxygen flow to 6 L/min. Next, an intravenous dose of 1% propofol (50 mg) was given, and the oesophageal foreign body removal surgery commenced with the patient in a semi-sitting position. There was no coughing or nausea reflex when gastroscope entered the oesophagus, with blood pressure stable at 156/73 mmHg, heart rate 98 beats/min, and the SpO2 at 100%. The patient displayed spontaneous breathing throughout the operation, and in using the WNJ, SaO2 was kept stable at 95% and above. The patient was able to open her eyes, answer questions clearly 10 minutes after removing the gastroscope. So then theWNJ was removed, and the patient sent back to the ward.

**DISCUSSION**

This case demonstrates the successful implementation of the WNJ in maintaining adequate oxygenation and ventilation after propofol infusion for the removal of an oesophageal foreign body in a patient with fragile cardiopulmonary function.

The most challenging procedure in this surgery was the anaesthesia. The depth of anaesthesia for the patient was difficult to manage, since shallow anaesthesia without proper management was unable to meet the needs of the surgery, and fragile cardiopulmonary function cannot withstand a strong reflection and circulatory fluctuations. Conversely, deep anaesthesia, can lead to significant collapse of the airway, a decrease in oxygenation and easily inducible acute coronary syndrome.

It was possible for general anaesthesia with endotracheal intubation to meet the surgery’s needs, with a secured airway and freedom to deepen anaesthesia with the use of a muscle relaxant. However, the risk of adverse events for the patient with microcirculatory abnormalities (compensatory hyperventilation, respiratory alkalosis) and debilitating cardiorespiratory function was too great to consider. Furthermore, the patient had previous oesophageal surgery with a history of radiotherapy, so the neck rigidity and the fragile natural of her oral...
In our case, the main advantage of using the WNJ was maintaining oxygenation and reducing cardiovascular stimulation by avoiding laryngoscopy in a patient with high cardiac risk, posted for a short duration surgery and having an anticipated difficult airway – though control of the depth of anaesthesia was challenging. Cardiovascular reactions and possible airway damage associated with endotracheal intubation by laryngoscopy, and the larger amount of anaesthetics necessary to tolerate endotracheal intubation as well, may cause more risks and poor prognosis to such a patient with a high risk for anaesthesia.

Also, the proximal part was in line with the threaded pipe, allowing for easy air exchange and mechanical ventilation, and the oxygenation effect was superior to the use of a mask, thereby allowing uninterrupted access for the procedure. Hence, a high flow of oxygen was used to fill the throat, allowing the weakened tidal volume and respiratory rate to be sufficient to meet the oxygenation requirements, and avoiding barotrauma, another potential complication. In our case, desaturation didn’t happen. However, if such circumstances really happened, we would firstly stop infusing propofol for a while, then adjust the depth of the WNJ or attempt supraglottic jet ventilation via WNJ, and open her airway with the jaw-thrust maneuver. If no improvement is observed in oxygenation after using these measures, pressurized mask ventilation would be performed. Endotracheal intubation and mechanical ventilation would also be performed, if necessary.

There was limited risk of short-term carbon dioxide retention, as the patient was in a hyperventilation and excessive carbon dioxide exclusion situation prior to the surgery. There was no fluctuation of respiration or circulation detected after removal of the tube, and there was no alveolar compliance changes or mechanical injury of the airway, minimizing injury to the patient due to the anaesthesia. However, care should still be taken that this may cause potential risks of nasal injury, and nasal bleeding though it is not invasive procedure.

**CONCLUSION**

WNJ can be considered as an alternative technique for patients with difficult airway conditions, and provide sufficient oxygenation and ventilation in patients with fragile cardiopulmonary function.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials 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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