Sevoflurane for difficult tracheal intubation

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Summary

Three patients in whom difficult tracheal intubation was expected but awake fiberoptic intubation was not feasible presented for head and neck surgery. Anaesthesia was induced rapidly and smoothly by inhalation of sevoflurane followed by fiberoptic or conventional tracheal intubation. (Br. J. Anaesth. 1997; 79: 392–393).

Key words

Anaesthetics volatile, sevoflurane. Intubation tracheal, difficult.

Sevoflurane is becoming regarded as the agent of choice for inhalation induction of anaesthesia. Several studies have demonstrated that rapid and smooth induction is possible with sevoflurane.1–6 However, inhalation induction with this agent has not been reported in the management of a difficult airway. We report three patients in whom we chose to induce anaesthesia by inhalation of sevoflurane because difficulty in managing the airway was anticipated and other techniques were not suitable.

Case reports

Patient No. 1

A 68-yr-old man with a carcinoma of the left maxillary sinus presented for radical maxillectomy, cervical lymph node dissection and reconstructive surgery. He was hypertensive and had chronic lung disease. He had restricted mouth opening. Nasal intubation was not possible because both nostrils were occluded by the tumour. Awake fiberoptic intubation under local anaesthesia was likely to be impossible because of intraoral protrusion of the tumour, excessive secretions and blood in the oropharynx. The patient refused tracheotomy under local anaesthesia.

After premedication with temazepam 10 mg orally and glycopyrronium 200 μg, a 16-gauge i.v. cannula was inserted and a crystalloid infusion was commenced. Droperidol 2.5 mg and fentanyl 50 μg were given i.v. Standard monitoring included pulse oximetry and ECG. Oxygen was given for 5 min via a circle system with a close fitting mask followed by up to 4% sevoflurane and 66% nitrous oxide in oxygen. After 120 s anaesthesia was sufficiently deep to allow tracheal intubation with a cuffed 7.0-mm tube passed over a flexible fiberoptic laryngoscope (LF2, Keymed plc, UK). Thereafter, anaesthesia was maintained with isoflurane and nitrous oxide in oxygen, with increments of atracurium and fentanyl. Both surgery and anaesthesia were uneventful.

Patient No. 2

A 45-yr-old man presented for parathyroidectomy. Conventional intubation had been impossible during a previous anaesthetic. He was educationally sub-normal, obese and had poor neck extension, coarse features with a large tongue, and very restricted mouth opening with only a few remaining teeth which were in poor condition. It was decided that conventional oral intubation would fail. He was unlikely to co-operate with awake intubation or tracheotomy. Therefore, it was decided to perform nasotracheal fiberoptic intubation.

He was premedicated with temazepam 10 mg orally and glycopyrronium 200 μg. He was given 100% oxygen for 5 min. Nitrous oxide 50% in oxygen was introduced with increasing concentrations of sevoflurane up to 7%. Initially maintaining a clear airway during anaesthesia proved to be difficult. Oxygen 100% was given until lightening of anaesthesia led to improvement in airway patency. Anaesthesia was administered successfully via the left nostril using a nasopharyngeal airway attached to a 15-mm tracheal tube connector and catheter mount connected to the anaesthetic system. Sevoflurane was reintroduced. A sufficient depth of anaesthesia was achieved and successful nasotracheal intubation was accomplished via the right nostril using a flexible fiberoptic laryngoscope. Anaesthesia for surgery was maintained as in the previous patient. The tracheal tube was removed at the end of surgery with the patient awake.

Patient No. 3

A 32-yr-old ASA III woman underwent uneventful resection of a left maxillary neuroblastoma with radical maxillectomy, orbital exenteration and resection of the nasal septum. She presented 5 days after this procedure for change of the obturator and packing.

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Her inter-incisor distance was only 2 cm at full mouth opening because of masseter spasm. There was no nasal airway as the septum had been removed and the cavity packed. Local anaesthesia for the oropharynx and larynx was inappropriate and unlikely in view of the previous surgery.

As surgery did not involve the temporomandibular joint, mouth opening was likely to improve allowing easy maintenance of the airway after induction of anaesthesia. It was decided that inhalation induction would be appropriate, followed by conventional or fibreoptic laryngoscopy.

She was given midazolam 3 mg and glycopyrronium 200 mg i.v. on arrival in the anaesthetic room. Her lungs were preoxygenated for 5 min. Anaesthesia was induced with up to 4% sevoflurane in oxygen. Her jaw relaxed and it was possible to introduce a McCoy laryngoscope blade and to view the arytenoid cartilages with flexion of the laryngoscope tip. Therefore, suxamethonium 100 mg was given and the trachea was intubated with the aid of a gum elastic bougie. Thereafter anaesthesia and surgery were uneventful.

Discussion

Inhalation induction of anaesthesia is a well recognized technique in the management of the difficult airway. Its inherent safety depends on gradual and smooth deepening of anaesthesia. If loss of muscle tone leads to loss of airway patency then anaesthesia inevitably lightens with return of muscle tone. We believe that sevoflurane offers major advantages compared with the usual agent, halothane. Many of our patients have had recent anaesthesia for endoscopy or biopsy and repeated halothane anaesthesia should be avoided where possible. Induction is smoother, faster and more pleasant than with halothane or isoflurane, with less coughing and breath-holding. If airway patency is lost, the lower blood solubility of sevoflurane leads to faster our patients, as we would have previously when using halothane, use of 100% oxygen as a carrier gas delays desaturation if obstruction occurs. Use of halothane without nitrous oxide sacrifices the benefit of the second gas effect resulting in a slower induction, whereas induction with sevoflurane in oxygen remains highly satisfactory, as in patient No. 3. Sevoflurane therefore offers a greater margin of safety than halothane in the management of the patient with a difficult airway.

Induction of anaesthesia in two of our three patients was smooth and fast. The third patient briefly developed airway obstruction but this was overcome readily without hypoxia. At no time during induction did $S\text{PO}_2$ decrease to less than 96% in any of our patients. Oxygenation and ventilation, as confirmed by pulse oximetry and capnography, were satisfactory throughout induction in two of the three patients. The second patient briefly developed airway obstruction during induction. This was caused partially by loss of the airway before adequate depth of anaesthesia for intubation was achieved. This resulted mainly from the patient’s abnormal anatomy. The obstruction was overcome by insertion of a nasopharyngeal airway before significant desaturation had occurred. Intubation was easy and rapid. The use of a laryngeal mask in these patients was not possible because of limited mouth opening and the type of surgery to be undertaken.

Concerns regarding sevoflurane cost and degradation by soda lime do not apply if it is used purely for induction. We have since used sevoflurane for inhalation induction in similar patients with success. We conclude that sevoflurane appears to be a useful agent for inhalation induction in patients with difficult airways and merits further investigation.

References