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Successful use of rocuronium and sugammadex in an anticipated difficult airway scenario

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SUMMARY

Neuromuscular blocking agents are often avoided in anticipated difficult airway scenarios. However, to facilitate jet ventilation, muscle relaxants are useful. We report a case of a potentially threatened airway in a 21-year-old with a large infraglottic pedunculated polyp. In this case rocuronium was used on induction to facilitate subsequent jet ventilation and periglottic laser ablation of the tumour. As the duration of the surgery was not predictable, the intention was to use sugammadex at the end to ensure complete reversal of muscle relaxation. This strategy also provided a quick rescue option if there was a sudden loss of the airway.

Key Words: sugammadex, anaesthesia, difficult airway, rocuronium

Laser ablation of vocal cord nodules are usually short procedures requiring maximum surgical access and visualisation. One described technique is the use of the laser-proof Hunsaker Mon-Jet tube (Xomed Surgical Co., Florida, USA) with jet ventilation and muscle relaxation[1,2]. There are many considerations including: 1) short procedure duration, 2) the requirement for muscle relaxation; and 3) the possibility of a threatened airway. Sugammadex, an effective and to date, a relatively safe reversal agent, has a potential role in these types of cases. Currently in our institution we keep sugammadex on the difficult airway trolley to be used for rescue in a 'can't intubate, can't ventilate' scenario. We report a case where sugammadex was used to provide reliable neuromuscular reversal following the use of rocuronium to facilitate airway surgery.

CASE HISTORY

A 21-year-old otherwise healthy male (108 kg, 187 cm) presented with a one-year history of progressive dysphonia. He also reported feeling "something moving up and down in the throat". Although he was able to lie flat, he did suffer some limitation with exercise. We assessed his airway to be Mallampati Grade 1. Nasoendoscopy in the ear, nose and throat clinic showed a large pedunculated polyp originating under the right vocal cord (Figure 1) occupying approximately 60 to 80% of the airway circumference, moving in and out of the larynx with respiration.

To facilitate laser ablation of the tumour with optimal surgical access to the airway, we decided to jet ventilate the patient using a Hunsaker Mon-Jet ventilation tube[1,2]. Intravenous anaesthesia was commenced using target-controlled infusions of propofol (6 μg/ml) and remifentanil (6 ng/ml). Dexamethasone 8 mg was administered to reduce airway inflammation and swelling. After confirming the ease of bag-mask ventilation, muscle relaxation was achieved by the administration of rocuronium

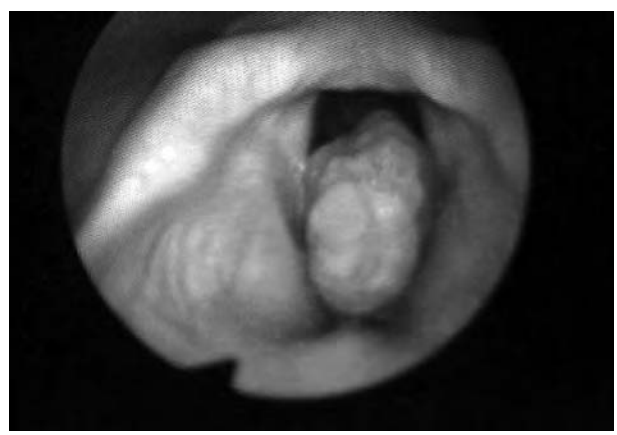

FIGURE 1: Pedunculated polyp originating under right vocal cord.

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0.6 mg/kg. Ninety seconds later, direct laryngoscopy confirmed the polyp to be in the laryngeal inlet occupying most of the airway. Using Magill's forceps, the jet ventilation tube was inserted past the polyp atraumatically. Low frequency manual jet ventilation was commenced with 12 breaths/minute (I:E ratio 1:4) using a Manujet (VBM Medizintechnik. Sulz, Germany) set to a pressure of 3 bar. Adequate ventilation with good expiration was confirmed by rise and fall of the chest and a square end-tidal CO_2 waveform from the gas-sampling sidearm of the Hunsaker tube.

Surgical removal of the polyp using a CO_2 laser via suspension laryngoscopy proceeded uneventfully. During the 20 minutes of the operation a further 10 mg of rocuronium was administered to achieve a train-of-four (TOF) of less than or equal to one in order to maintain optimum conditions for jet ventilation and to prevent sudden movement of the vocal cords during the laser ablation of the tumour. Towards the end of the operation the patient was given fentanyl 50 μg and parecoxib 40 mg intravenously.

At the end of surgery, the TOF was zero, with a post-tetanic count of five twitches (TOF Watch, Organon Technika, Netherlands). A 4 mg/kg dose of sugammadex was given based on the patient's estimated lean body weight of 100 kg. The return of the TOF ratio to greater than 0.9 took 1 minute 45 seconds after sugammadex administration and soon after the patient was extubated awake without a problem.

DISCUSSION

Recently, the benefits of sugammadex have been widely discussed, often focusing on its use in the unanticipated difficult airway where it might be helpful as a rescue in a 'can't intubate, can't ventilate' scenario[3-5].

Here we describe the use of the drug in the anticipated difficult airway scenario where muscle relaxation was considered beneficial, and to antagonise rocuronium at the end of a relatively short procedure with the intraoperative demand for complete paralysis. Sugammadex, a Y-cyclodextrin, has been shown to non-competitively encapsulate and inactivate aminosteroidal drugs such as rocuronium with good efficacy, and to date appears to have a good safety profile even across the extremes of age and organ failure[6-9]. In controlled studies, sugammadex has proven effective for reversal of even profound neuromuscular block within three minutes of administration of an intubation dose of rocuronium (1 to 1.2 mg/kg), a feature that is not achievable with cholinesterase inhibitors[4,5,10-13]. If neuromuscular blockade is deemed essential, even the use of short-acting muscle relaxants such as suxamethonium is no guarantee of rapid recovery. Both Naguib et al and Benumof et al have documented that spontaneous recovery from suxamethonium is generally too slow to avoid haemoglobin desaturation before returning to the unparalysed state[14,15].

The decision in this case to use an intermediate-acting neuromuscular blocking agent for a short case on a potentially threatened airway was facilitated by the availability of a highly effective, speedy and safe reversal agent. The unwanted side-effects associated with the use of acetylcholinesterase inhibitors (bradycardia, salivation, altered gut motility, bronchospasm and postoperative nausea and vomiting) were also avoided[16,17]. Another potential advantage of sugammadex in this situation was that the patient could be promptly extubated and the theatre list was not delayed. This may have cost-saving implications.

This case has demonstrated the effective use of sugammadex in a wider context than is currently advocated in our institution. It is an exciting new drug in the anaesthetist's armamentarium and one that may bring about the demise of suxamethonium or at least a change of location from the top of the anaesthetic trolley to the second or third drawer.

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