

# Anaesthetic management of bronchopleural fistula in a patient with myasthenia gravis

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## ABSTRACT

**Patients with bronchopleural fistula present with specific airway management and ventilatory concerns, which makes the anaesthetic management of these patients challenging. Myasthenia gravis is another condition requiring specific anaesthetic management, with possible unpredictable delays in recovery. A combination of both these conditions in a patient makes management even more difficult. Our patient with myasthenia gravis underwent repair of the bronchopleural fistula, during which a multimodal approach to intraoperative and postoperative analgesia was adopted. Positive pressure ventilation was started only after we confirmed the isolation of the lung.**

**Keywords:** anaesthetic management, bronchopleural fistula, desflurane, double lumen tube, myasthenia gravis

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## INTRODUCTION

Patients with bronchopleural fistula present with difficulties in airway management and ventilatory concerns. This makes the anaesthetic technique difficult to perform. Myasthenia gravis is another condition whereby specific anaesthetic management is required and where unpredictable delays in recovery can occur. A combination of both these conditions in a single patient makes the management even more challenging.

## CASE REPORT

We present a case of a 66-year-old man with myasthenia gravis Class 2A (Myasthenia Gravis Foundation of America Clinical Classification). At presentation, he had been on treatment with pyridostigmine 60 mg bd and propantheline 15 mg tds. The patient was scheduled for thoracoscopic repair of the bronchopleural fistula. He had undergone a right-sided, video-assisted thoracoscopic (VAT) lobectomy 14 days ago, after which he developed a bronchopleural fistula.

On the day of surgery, the patient was administered pyridostigmine and propantheline. He had a chest tube in the right pleural cavity that was patent. The anaesthetic management plan was to achieve rapid and accurate lung separation before instituting positive pressure ventilation, so as to optimise ventilation and oxygenation without further disruption of the fistula as well as to avoid the possibility of tension pneumothorax on the diseased lung. As our patient was a known case of myasthenia gravis, we aimed to achieve these targets without the use of a muscle relaxant, and thus, the patient's airway was desensitised to decrease the stress response to intubation.

Firstly, 4 ml of lidocaine 2% was nebulised for 20 minutes. Then, the patient was given 2% lidocaine viscous to gargle. Adequate pre-oxygenation with 100% oxygen for five minutes was conducted to increase the respiratory oxygen reserve of the patient before the induction of anaesthesia. The patient was induced with propofol 2 mg/kg with a target control remifentanyl infusion (plasma concentration  $C_p$  2.0 ng/ml). Infraglottic desensitisation of the airway was achieved using 2 ml of transtracheal lidocaine 2% through the cricothyroid membrane. Before intubation, the patient's epiglottis, larynx and vocal cords were sprayed with 10% lidocaine spray (20 mg). He was then intubated with a 37F Mallinckrodt Broncho-cath™ (Mallinckrodt Medical Ltd, Athlone, Ireland) left double lumen tube, which was placed in the left main stem bronchus under visual guidance of a bronchoscope, thus ensuring no further disruption of the stump. The tracheal and bronchial cuffs were inflated under direct vision, and lung isolation was achieved. After achieving lung separation, positive pressure ventilation of the non-operated lung with pressure control mode was initiated. The patient's lung was ventilated with a peak pressure of 20 cm H<sub>2</sub>O, at a rate of 12 breaths per minute and an inspiratory oxygen concentration of 60%. The chest tube was removed only after lung isolation and the initiation of one-lung ventilation.

Besides remifentanyl, multimodal analgesia was augmented with acetaminophen suppositories 975 mg and intercostal nerve block (10 ml of 0.5% bupivacaine) before surgical incision. The surgery lasted for three

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hours. The patient was administered 7 mg intravenous morphine and 30 mg ketorolac during surgery. At the end of the surgery, remifentanyl infusion was stopped and desflurane was washed off. The patient returned to spontaneous ventilation with adequate tidal volume. He was extubated while awake. Patient-controlled analgesia (PCA) with intravenous morphine was arranged for postoperative pain control with the following settings: a bolus dose of 1 mg, lockout interval of five minutes, no baseline infusion and a maximum dose delivery of 10 mg/hr.

Post surgery, the patient was transferred to the high dependency unit (HDU) for monitoring. His stay in the HDU was uneventful. He was moved to the general ward on postoperative Day 2. The total PCA requirement of morphine during the first 24 hours was 17 mg. He experienced no complication after surgery and was discharged from the hospital on postoperative Day 5. No complications were noted at any of the follow-up visits.

## DISCUSSION

The use of muscle relaxants in patients with myasthenia gravis has been a controversial topic. It is difficult to determine the optimal amount of muscle relaxants required in a patient with myasthenia gravis. Hence, there is an increasing trend of using non-muscle relaxant techniques in such patients who undergo surgery.

The use of a fentanyl-propofol combination,<sup>(1)</sup> fentanyl-sevoflurane combination,<sup>(2)</sup> and more recently, a sufentanyl-propofol<sup>(3)</sup> or remifentanyl-propofol combination<sup>(4)</sup> has been reported in the literature. Some studies have also reported the use of thoracic epidural in combination with techniques of general anaesthesia.<sup>(5)</sup> All these techniques warrant the use of generous local anaesthetic techniques to obtund airway reflexes during intubation. Recently, epidural analgesia has been safely used in paediatric myasthenic patients as well.<sup>(6)</sup> Generally, epidural catheter for pain control is more helpful in thoracotomy cases rather than VAT surgery. In the case of our patient, however, epidural analgesia was not used. Instead, we opted for a multimodal approach to intraoperative and postoperative analgesia. Our patient was given suppositories of acetaminophen, intercostal nerve blocks as well as intravenous morphine and ketorolac. Postoperatively, PCA with intravenous morphine was used. This can be corroborated from the fact that the

total requirement of PCA morphine was 17 mg in the first 24 hours and 26 mg in 48 hours, after which PCA was stopped.

Our patient also presented with another major problem, bronchopleural fistula. This meant that a swift and accurate process of lung separation was required before we could commence with the initiation of positive pressure ventilation. A non-relaxant technique is superior in this regard, as it does not involve a wait for the effects of the relaxant to start working. We suspended the ventilation of the patient until the lung was isolated under bronchoscopic guidance. Therefore, proper pre-oxygenation was very important. Positive pressure ventilation was initiated only after lung separation in order to avoid further disruption of the stump and to prevent wasted ventilation through the fistula. Ensuring that the chest tube is working prior to intubation is crucial; it avoids the possibility of tension pneumothorax. In any case, in order to prevent complications, the chest tube should be removed only after isolating the lung.

The technique described is unique, as it considers all aspects of safe airway management in a patient with myasthenia gravis who presents with a bronchopleural fistula. The non-relaxant technique allows for early recovery of the patient to spontaneous respiration. Patients with a repair of bronchopleural fistula should be converted to spontaneous respiration, and preferably, extubated as soon as possible, thus avoiding positive pressure ventilation and protecting the repair of the fistula. This technique also hastens the achievement of this goal.

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