



BMH Med. J. 2026;13(1):17-20. **Case Report**

Peri operative management of robotic assisted thoracoscopic thymectomy in a patient with myasthenia gravis

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Introduction

Myasthenia gravis (MG) is an autoimmune disorder of the neuromuscular junction in which antibodies directed against postsynaptic acetylcholine receptors (AChR) causes fluctuating muscle fatigue and weakness [1]. The prevalence of MG is estimated at 15-20 per 100,000 population, with a bimodal distribution affecting young women and older men [2]. Thymectomy is a crucial component in the treatment of generalized MG and has been proven to improve outcomes and reduce reliance on long-term immunosuppressive therapy in selected patients [3]. Nowadays open trans sternal thymectomy is replaced with thoracoscopic or robotic thymectomy techniques.

Robotic-assisted thoracoscopic surgery (RATS) for thymectomy represents the technological progress in surgical management, providing three-dimensional visualization, improved precision, and minimal invasiveness compared to open or conventional video-assisted thoracoscopic surgery (VATS) [4]. An analysis published recently by Giovanni M Comacchio et al [5] of 20 years surgical outcome, showed a better long term outcome in terms of remission or reduction rate in most patients following robotic thymectomy. But the drawback of the study was its retrospective nature. However RATS also poses additional anaesthetic challenges including complicated patient positioning, the requirement of one-lung ventilation (OLV), along with the altered neuromuscular physiology due to MG and its treatment [4]. Successful anesthetic management requires careful preoperative optimization, meticulous selection and titration of neuromuscular blockade, and vigilant monitoring to avoid postoperative respiratory complications or myasthenic crisis [1,2].

Case Report

A young male weighing 68 kg with generalized MG which was diagnosed six months earlier, was scheduled for elective robotic VATS thymectomy. His primary complaints were dysphagia and nasal

regurgitation. He was on pyridostigmine 60 mg every four hours, oral prednisolone 10 mg once daily, and mycophenolate mofetil 500 mg once daily. Multidisciplinary assessment by neurology, pulmonology, and cardiology was completed, and he had been practicing incentive spirometry regularly. Routine laboratory values were normal.

On the day of surgery, his regular morning doses of pyridostigmine, prednisolone, and mycophenolate were administered. High-risk informed consent was obtained, emphasizing the potential need for postoperative ventilation due to delayed recovery. Premedication with intravenous midazolam 1 mg, glycopyrrolate 0.2 mg, pantoprazole 40 mg, metoclopramide 10 mg, and dexamethasone 8 mg was given.

In the operating room, standard ASA monitors like five lead ECG, non invasive blood pressure monitoring, pulse oximeter and temperature monitors were applied. A remifentanyl bolus of 40 microgram was given, followed by an infusion at 300 microgram/hr. A thoracic epidural catheter at T5-T6 was inserted under local anaesthesia and after confirming the position an infusion of 0.1% ropivacaine at 8 ml/hr was started to supplement peri operative analgesia.

Anaesthesia was induced with a titrated doses of IV propofol. Rocuronium 30 mg IV was administered after confirming adequate mask ventilation, and tracheal intubation was performed using a 41F left-sided double-lumen tube and correct placement was verified with selective clamping of tracheal and bronchial lumen. Cuff pressure of tracheal lumen was kept at 25 cm H₂O and that of bronchial lumen was 10 cm H₂O. Anaesthesia was maintained with sevoflurane in an air-oxygen mixture along with thoracic epidural and remifentanyl infusions.

Ventilation was set to pressure control ventilation with volume guaranteed (PCV-VG) (tidal volume 450 ml, respiratory rate 14/min, PEEP 6 cmH₂O). A right subclavian central line and left radial arterial catheter were placed, and baseline ABG recorded. Neuromuscular function was assessed with train-of-four (TOF) monitoring to guide further rocuronium administration. A body warmer (Bair Hugger) and a fluid warmer were kept throughout the procedure.

The patient was positioned in a semi-supine orientation at an angle of 30 degrees, with meticulous padding of all pressure points and appropriate ocular protection. Following the completion of port placement on the right side, one-lung ventilation (OLV) was initiated by occluding the tracheal lumen. Ventilation parameters were meticulously adjusted (tidal volume of 325 ml, respiratory rate of 20/min) with a positive end-expiratory pressure (PEEP) of 6 cm H₂O to ensure normocapnia and adequate oxygenation. Prior to robotic docking, all lines were secured with extension lines, fastened to preclude any potential leakage, and pressure points were thoroughly re-evaluated.

Anaesthesia was maintained with sevoflurane (0.7-1.2 MAC) and remifentanyl titrated to maintain stable hemodynamics. The 180-minute surgery proceeded uneventfully with no adverse haemodynamic and respiratory parameters. At the end of the procedure, two-lung ventilation was resumed, and the double-lumen tube replaced with a single-lumen tube. Intercostal drain was inserted to prevent pneumothorax. Rocuronium was reversed with sugammadex 140 mg under quantitative TOF monitoring, confirming full recovery (TOF ratio more than 0.9). The patient demonstrated strong spontaneous ventilation and was extubated in the operating room.

Postoperative analgesia consisted of continuous epidural ropivacaine infusion, intravenous paracetamol, and rescue opioid doses when required. The patient was shifted to the high dependency unit for observation. Pyridostigmine was restarted as per schedule. Postoperative recovery was uneventful with no evidence of respiratory compromise or myasthenic exacerbation. The patient was discharged on postoperative day three.

Discussion

The anesthetic management of MG patients undergoing robotic thoracoscopic thymectomy is challenging because equal emphasis should be given to providing optimal surgical conditions and preventing excessive neuromuscular depression [1-23]. Receptor down regulation makes MG patients particularly sensitive to non-depolarizing neuromuscular blocking agents, and resistant to depolarizing agents like succinylcholine [2,3]. Careful dose titration and quantitative neuromuscular monitoring are of paramount importance.

Careful titration of neuromuscular blocking agents, tailored to TOF monitoring, ensures predictable onset and recovery. We have used incremental doses of rocuronium under TOF monitoring for intubation and during surgery and effectively reversed with sugammadex. Sugammadex encapsulates rocuronium molecules directly, allowing rapid and complete reversal without interfering with cholinergic transmission which is quite beneficial in these cases [6]. Several studies have shown that it has faster recovery and fewer respiratory complications compared to neostigmine in MG patients [6].

Robotic thymectomy introduces specific anesthetic concerns, inaccessible airway after docking, prolonged surgical duration, capnothorax and high airway pressure in addition to the physiologic challenges of one lung ventilation (OLV) [6]. Compared to video assisted thoracoscopic surgery, RATS has shown reduced drain output, lesser blood loss and lower length of hospital stay [7]. But each institution may have a learning curve which results in longer duration of surgery. Studies have shown left sided approach to be superior to the right sided approach in terms of complications [8].

Capnomediastinum and manipulation of major mediastinal vessels can cause significant hemodynamic changes during RATS [9]. One-lung ventilation can compromise oxygenation due to shunting, ventilation-perfusion mismatch and mediastinal manipulation; thus, lung protective strategies like moderate PEEP, low tidal volumes, and maintenance of normocapnia are crucial [6].

Effective postoperative analgesia prevents respiratory depression and promotes early mobilization. Thoracic epidural analgesia provides adequate analgesia with local anesthetic infusions and can be combined with multimodal systemic analgesic drugs. Analgesia facilitates good respiratory effort which improves overall outcomes [6]. It is important to remember to resume anticholinesterase therapy and steroids immediately in the post operative period to prevent myasthenic crisis [1,3].

Conclusion

With improved anaesthesia techniques and medications, there is a relook on surgical approaches from open thymectomy to thoracoscopic and recently to robotic minimally invasive approaches. Robotic-assisted thoracoscopic thymectomy in patients with MG requires an individualized anaesthetic plan focusing on reduced dosing and precise titration of neuromuscular blockers, monitoring, use of rapid and complete reversal with sugammadex, and vigilant perioperative respiratory management. We believe in the use of rocuronium for intubation and surgical relaxation and reversal by sugammadex. Multidisciplinary team involvement, preoperative optimization and careful postoperative monitoring are essential for ensuring smooth recovery and favorable outcomes in these complex cases.

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