



# Spontaneous ventilation in thoracoscopic thymectomy: breathing freely

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Comment on: Jiang L, Liu J, Gonzalez-Rivas D, et al. Thoracoscopic surgery for tracheal and carinal resection and reconstruction under spontaneous ventilation. *J Thorac Cardiovasc Surg* 2018;155:2746-54.

Submitted Jul 12, 2018. Accepted for publication Sep 17, 2018.

doi: 10.21037/jtd.2018.09.96

View this article at: <http://dx.doi.org/10.21037/jtd.2018.09.96>

Long Jiang and colleagues, published a study in the April 2018 issue of *The Journal of Thoracic and Cardiovascular Surgery* comparing the standard intubated video-assisted thoracic thymectomy (IVATT) to a spontaneous ventilation video-assisted thoracic thymectomy (SV-VATT) (1). They performed a retrospective analysis of consecutive patients, who had undergone a thymectomy after being diagnosed with myasthenia gravis (MG).

Patients in the IVATT group were induced with propofol (target plasma concentration 3 µg/mL), sufentanil (0.4 µg/kg), and cisatracurium (0.2 µg/kg), and then were intubated with a double-lumen tube via laryngoscopy. Anesthesia was maintained with sevoflurane, propofol, and remifentanyl. Alternatively, patients who had undergone SV-VATT were induced with propofol (with a target-plasma concentration to 2–3 µg/mL) and sufentanil (0.1–0.2 µg/kg). No muscle relaxants were used. A thoracic epidural was then inserted, for an administration of 2% lidocaine and then 0.375% ropivacaine, as needed; with an anesthesia level reaching between T2 and T10. A laryngeal mask was then placed for oxygenation, and anesthesia was maintained with propofol and dexmedetomidine (0.5–1.0 µg/kg/hr). Intraoperatively, under thoracoscopic guidance, 6 mL of lidocaine 2% was sprayed on the lung surface to reduce coughing. The goal spontaneous respiratory rate was set to 12–20 breaths/minute. Both groups had maintained a BIS within 40–60.

After patients were appropriately anesthetized, surgical management proceeded in the same manner in both groups. After the operation, patients in the IVATT group

were extubated, as was clinically appropriate, and patients undergoing SVATT, had their epidural catheters removed in the operating room. All patients were sent to recover in the post-anesthesia care unit, unless they had required continued intubation, in which case, they were sent to the intensive care unit. Patients were monitored for post-operative complications, pulmonary complications (infection, atelectasis), myasthenic crisis (MC), sore throats, and pain. It was also noted whether or not patients required a conversion to intubation, or experienced delayed extubation.

Post-operative patients in the IVATT group experienced more complications, including sore throats, air leaks, and pulmonary infections. One patient in the SV-VATT group had required a conversion to intubation along with a thoracotomy, this was attributed to dense pleural adhesions. Those in the IVATT group experienced more instances of MC, 14 patients (20.6%) vs. 1 patient (2.8%) in the SV-VATT group. Eighteen patients in the IVATT group (26.5%) also experienced delayed extubation, versus 1 patient in the SV-VATT group (2.8%). Length of hospital stay was longer for IVATT patients at 8.8±4.7 vs. 6.8±2.7 days, P=0.02.

Due to the non-randomized selection of patients into each group, the authors then matched patients according to a propensity score, which used variables such as: age, sex, body mass index, smoking status, comorbidity, pulmonary function tests, preoperative medication, and their clinical severity, according to the Myasthenia Gravis Foundation of America clinical classification scheme. Of the original

36 and 68 patients who had undergone SV-VATT and IVATT, 27 were included in each group for analysis after a propensity score matching. The matched patients then continued to show no differences in surgical duration, mean lowest SpO<sub>2</sub>, or urine output. SV-VATT patients continued to show higher mean peak EtCO<sub>2</sub>, while IVATT patients experienced more complications. MC occurred in 3 patients who underwent IVATT (11.1%) *vs.* 0 SV-VATT patients and 6 IVATT patients (22.2%) required intubation >1-day *vs.* 0 SV-VATT patients. Post-operative pain was also lower and average length of hospitalization was shorter in the SV-VATT group.

Since the first case reports describing thymectomy in patients who were diagnosed with MG by Blalock *et al.* (2,3) to the randomized controlled trial by Wolfe *et al.* had favorably compared thymectomy plus prednisone to prednisone alone (4), much effort has gone into investigating the safest way to treat this patient population. While these studies had used the trans-sternal approach as the accepted standard, the use of video-assisted thoracoscopic (VATS) techniques have emerged as having comparable clinical outcomes, with decreased complications, improved pain, and shorter hospital stays (5,6).

Despite the proven benefits of a VATS thymectomy over medical treatment alone, patients with MG still present a unique challenge to surgeons and anesthesiologists, with surgery acting as an inciting factor that could send these patients into respiratory failure (7). In an effort to minimize the risk posed by anesthesia in MG patients, Della Rocca *et al.* compared anesthetic techniques without neuromuscular blockades during trans-sternal thymectomy, (instead, using propofol or sevoflurane) (8). They showed these regimens to not only allow for adequate intubating conditions, but also early extubation in the operating room. Similar results were achieved by Gritti *et al.* in patients undergoing a VATS thymectomy (9).

Although the authors were able to show a lower incidence of MC, and fewer patients experienced prolonged intubation, by maintaining spontaneous ventilation, this is likely not attributable to the IVATT versus SV-VATT technique. The use of an invasive intubation was not the only variable between the groups, but likely the most significant. It is unclear why the authors chose to use paralytics in patients who were undergoing IVATT, as this is not necessary, and clearly has significant side effects in myasthenic patients. One could argue that the use of a paralytic alone, can explain the most significant complications in the IVATT group. Calling into question the

validity of the comparison in this study. However, despite the aforementioned flaws, this work demonstrates that the technique of SV-VATT for thymectomy in myasthenic patients, is feasible and appears to be safe. Longer term follow-ups of these minimally invasive techniques will be needed, to address the impact of these techniques on the remission of myasthenia.

### Acknowledgements

None.

### Footnote

*Conflicts of Interest:* The authors have no conflicts of interest to declare.

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(English Language Editor: Jeremy Dean Chapnick, AME Publishing Company)

**Cite this article as:** Cohen B, Marshall MB. Spontaneous ventilation in thoracoscopic thymectomy: breathing freely. *J Thorac Dis* 2018;10(Suppl 33):S3859-S3861. doi: 10.21037/jtd.2018.09.96