Editorial

Video-assisted thoracoscopic surgery versus robotic-assisted thoracoscopic surgery and postoperative opioid consumption

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Even though the concept of thoracoscopy was first described in 1910s, video-assisted thoracoscopic surgery (VATS) was not used in the operating rooms until 1990's (1). The use of VATS lobectomy procedures, compared to open approaches, increased from 10% in 2002 to 29% in 2007 (1,2). The reason for the popularization of VATS, as an alternative to thoracotomy, was the suggestion that VATS could reduce the surgery-related complications (1). A more recent and similarly less invasive alternative to VATS is robotic-assisted thoracoscopic surgery (RATS).

With the development of these less invasive, more technologically expensive techniques, there is a need to determine whether RATS is an improvement compared to VATS. In this issue of the *Journal of Thoracic Disease*, Duclos *et al.* reported results of a prospective observational study to compare morphine consumption for 48 hours after VATS *vs.* RATS (3). The primary outcome of morphine consumption included morphine used in the recovery room, surgical unit and oral oxycodone utilization, converted to intravenous morphine equivalents. Secondary objectives were to compare hemodynamic and respiratory changes between these procedures. The authors analyzed the data in two different ways and reached similar conclusions. For the first set of analyses, they compared the day 2 morphine consumption of 95 (53%) VATS patients to 84 (47%) RATS patients based on univariate analyses. That is, this set of analyses was not based on propensity score matching nor was adjusted for any other patient characteristics. For the second set of analyses, 75 patients from each group were matched based on age, sex and American Society of Anesthesiologists (ASA) score using the propensity score. Then, a multivariable linear regression model adjusting for the body mass index and the use of paravertebral blocks (PVB) was conducted, and morphine consumption on day 2 were compared among the two groups. Based on both sets of statistical analyses, the authors concluded that RATS, compared to VATS, was associated with a statistically significant increased use of morphine on the second postoperative day.

Perioperative hemodynamic and respiratory changes were assessed for 51 VATS and 52 RATS patients. The authors reported that VATS was associated with significantly better hemodynamic and respiratory parameters compared to RATS.

Some strengths and limitations of the study should be recognized. First, the authors provided their detailed morphine protocol for the primary outcome variable of morphine consumption (in the supplementary material). Non-opioid adjuncts were per protocol and the impact of the analgesic effect of PVB was mitigated by the propensity score matching. Second, in Table 1, the authors showed that VATS *vs.* RATS groups were not different based on the pre-operative characteristics. However, duration of surgery was longer for the RATS group than the VATS group (160±45 *vs.* 143±50 minutes, P<0.01). It is possible that the duration of surgery could be an influence on postoperative opioid requirements. In addition, the authors provided the sample size calculation for the study, but did not consider the propensity score matching. Jung *et al.* showed by simulation that, when the distribution of covariates is unbalanced

between groups, propensity score analyses ignoring the strata would be unpowered (4). In this study by Duclos, the durations of surgeries were slightly imbalanced. Neither the propensity score matching, nor the adjustment in the multivariable model, considered the duration of surgery; but the model was adjusted for the PVB. Because of the differences in duration of surgery provided on Table 1, multivariable analyses could have been adjusted for the surgical duration. It was reassuring that results were consistent based on propensity score matched data and the univariate analyses.

The authors provided a sound analysis for a prospective observational study. Randomized trials may not always be the most feasible option. Prospective observational studies permit more consistent data collection compared to retrospective chart reviews. When there is no equipoise in randomizing patients to groups, prospective observational studies may be used to increase the generalizability of the results. However, there are limitations on prospective observational studies. For example, because of the lack of randomization, there is a possibility of bias. For example, patients who had VATS may not be candidate for RATS. Therefore, there could be underlying systematic differences between the groups for each surgical technique. The propensity score analysis is an attempt to reduce obvious biases.

There is a scarcity of the studies comparing RATS *vs.* VATS for similar outcomes. The observational nature of the study requires sound statistical analyses which the authors utilized. The reported 6.7 mg greater usage of morphine equivalents utilized on postoperative day 2 for RATS patients is small; postoperative day 1 opioid use was not different (P=0.51). In conclusion, results based on this study preclude suggesting, based on the primary outcome of opioid utilization within 48 hours, that one surgical technique should be favored over another. As the authors indicated, larger and/or randomized studies are needed to reach more definitive conclusions on differences between RATS *vs.* VATS.

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Footnote

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References

1. Dziedzic D, Orlowski T. The Role of VATS in Lung Cancer Surgery: Current Status and Prospects for Development. Minim Invasive Surg 2015;2015:938430.
2. STS General Thoracic Surgery Executive Summary. Available online: https://www.sts.org/sites/default/files/documents/GTSD_ExecutiveSummary_Spring2017.pdf
3. Duclos G, Charvet A, Resseguier N, et al. Postoperative morphine consumption and anaesthetic management of patients undergoing video-assisted or robotic-assisted lung resection: a prospective, propensity score-matched study. J Thorac Dis 2018;10:3558-67.
4. Jung SH, Chow SC, Chi EM. A note on sample size calculation based on propensity analysis in nonrandomized trials. J Biopharm Stat 2007;17:35-41; discussion 43.

