Editorial

Pain control after thoracic surgery begins in the operating room

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Enhanced recovery after surgery (ERAS) is a strategy utilized by many surgical specialties to hasten post-operative recuperation and minimize complication rates. Although this aim was first explored in colorectal surgery patients in the early 2000's, it has yet to be fully adapted in the field of thoracic surgery (1). For example, we have largely proven that minimally invasive techniques such as video-assisted thoracoscopic surgery (VATS) for early-stage lung cancer is superior to open thoracotomy in reducing complication rates (2,3). Additionally, reducing the number of port sites and post-operative thoracostomy drainage sites reduces 30-day morbidity, complication rates, and mortality (4). Yet, one of the most common complications following thoracic surgery is pain (5). Opioid use after thoracic surgery has been associated with increased length of stay, increased complication rates, prolonged time to return of bowel function, prolonged time to enteral feeding, and delay in ambulation (1,6). Since the inception of ERAS, the guidelines have aimed to better control post-operative pain while staving off opioid dependence by focusing on limiting narcotic use through post-operative multimodal analgesic methods (7). Multimodal pain regimens have also been proven effective in reducing post-operative complications and possible sequelae of poor pain control such as atelectasis and pneumonia (8). Thoracic epidural analgesia (TEA) and paravertebral block (PVB) has proven as effective in reducing post-operative pain compared to systemic intravenous opioid patient-controlled analgesia (PCA) and is currently the ERAS gold standard (9,10). Additionally, as in our institution, use of intercostal nerve blocks (ICNB) or catheters are easily administered and frequently utilized with equivalent pain control to TEA (11). However, it has yet to be elucidated which combination of analgesics best aid in obtaining rapid recovery.

Qiu *et al.*, report on post-operative pain and quality of clinical recovery in patients undergoing VATS lung resection (12). The authors performed a prospective clinical trial in which they randomized patients undergoing VATS for early-stage lung cancer into receiving standard routine general anesthesia (n=80) and compared them to opioid-sparing anesthesia (n=79). The primary objective was to evaluate the impact of opioid-sparing analgesia methods on patient recovery utilizing the Quality of Recovery 15 scale (QoR-15) compared to routine anesthesia methods in patients undergoing elective VATS. Secondary objectives were to explore opioid-sparing analgesia on opioid related adverse effects, immediate postoperative and 30-day clinical recovery.

All patients were given propofol and remifentanil for induction of anesthesia. After propofol induction, the routine anesthesia group was given standard sufentanil anesthesia and non-steroidal analgesic flurbiprofen intraoperatively whereby the opioid-sparing group was given a T4-T6 PVB with 0.5% ropivacaine and 5 mg dexamethasone. After VATS, both groups were given a sufentanil PCA pump and twice daily parecoxib. The authors did not address why the additional flurbiprofen non-steroidal analgesic was only given to the routine anesthesia group. This discrepancy introduces an additional mechanism of pain relief which could contribute to the result that opioid-sparing group was not superior to routine anesthesia in the immediate, 6-hour, post-operative period.

Additionally, locoregional blocks, such as ICNB, may aid in further reduction of pain relief in the immediate post-operative period, 6 hours post-operatively, compared to TEA or PVB alone. In a systematic review and meta-analysis of thoracic surgery patients, single-injection ICNB was associated with reports of lower static pain 0 to 6 hours post-operatively (13). However, 48 hours after surgery, patients who were administered single-injection ICNB had lower opioid use compared to systemic analgesia, but higher opioid use compared to TEA or PVB. However, the immediate analgesic effect of single-injection block was superior, the analgesic effect of ICNB could be prolonged given a change in anesthetic such as liposomal bupivacaine or by utilizing a catheter for prolonged use with PCA. Though there have been studies that report improved outcomes and reduced opioid use with liposomal bupivacaine use in ICNB, there have been mixed results and larger scale clinical trials are needed (14,15).

Patients were matched for surgical type (wedge resection, segmentectomy, or lobectomy) and extent of surgical invasiveness (i.e., number of chest tubes or number of port-site incisions) and there was no significant difference between the number of patients in the routine or opioid-sparing anesthesia groups. The authors acknowledge that 60% of the patients underwent sub-lobar resections and opioid-sparing anesthesia may not be beneficial in patients undergoing more extensive surgical interventions. Subgroup analysis comparing surgical type or surgical invasiveness and QoR-15 scores, or overall benefit of anesthesia satisfaction (OBAS) score was not conducted. However, this analysis could elucidate which patient populations opioid sparing anesthesia would be appropriate for.

The authors chose QoR-15, a 15-question survey that assesses quality of life, as the objective measurement of clinical recovery. The authors note that in a previous 2016 study, the QoR-15 score must change by 8 points in order to have a meaningful change in health status or minimal clinically important difference (MCID). The authors found that QoR-15 score in the opioid-sparing anesthesia group was higher at 6, 24, and 48 hours, however the median difference in score was only above 8 at 24 hours. This result may be multifactorial. The authors acknowledge that using patient questionnaires is limiting and it is also possible that this may be secondary to previously mentioned additional NSAID usage in the routine anesthesia group. The authors also speculate, as previous experts have, that QoR-15 score is more difficult to interpret without patients' baseline pre-operative values. Of note, since the study determining MCID for QoR-15 was published in 2016, the authors re-analyzed the data and determined an MCID of 6 is more accurate (16). Thus, there may be a questionnaire with a higher sensitivity to assess clinical recovery in this patient population. Also, interpreting patient recovery may be better suited for an objective measurement, however, currently there is no comprehensive objective measurement tool that is validated for use in thoracic surgery patients.

The opioid-sparing anesthesia group had lower OBAS scores and less post-operative pain at 6, 24 and 48 hours with less opioid-related side effects of nausea and dizziness compared to routine anesthesia. Quality of life on post-operative day 30 was no different between opioid-sparing and routine anesthesia groups. Time to mobilize and time to first flatus were shorter in the opioid-sparing anesthesia group.

The authors discuss several limitations of their study. This was a single center trial. Patients were relatively young and without severe comorbidities, thus the results cannot be generalized to all patients undergoing elective VATS.

The study suggests that patients undergoing elective VATS may benefit from intraoperative opioid-sparing general anesthesia utilizing paravertebral blockade with ropivacaine instead of routine systemic opioid use, with improved post-operative recovery 24 hours after surgery and no significant difference in 30-day outcomes. Studies that elucidate not only post-operative, but multimodal intra-operative analgesic use, are needed to aid in further improving recovery in thoracic surgery patients.

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